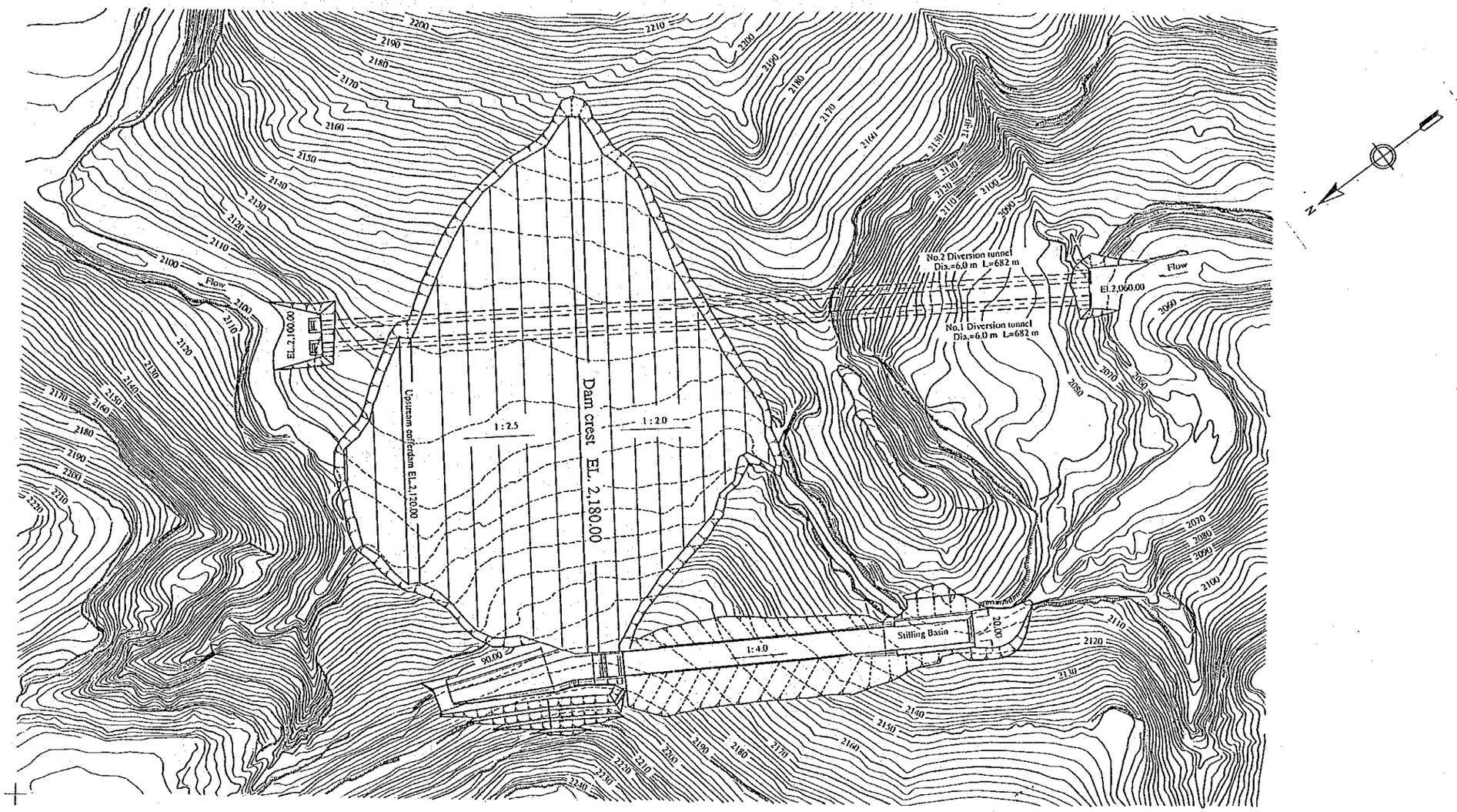
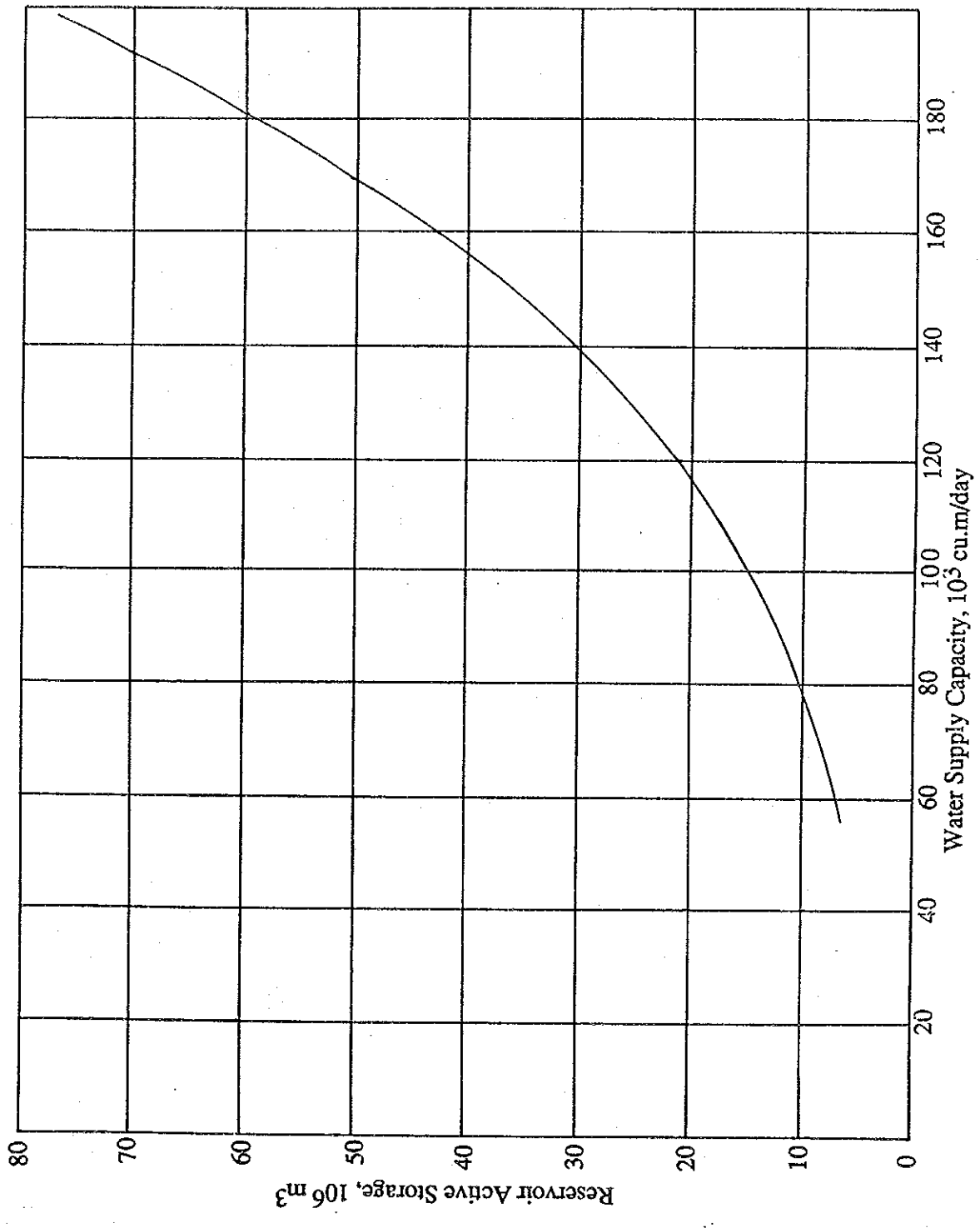


GENERAL PLAN

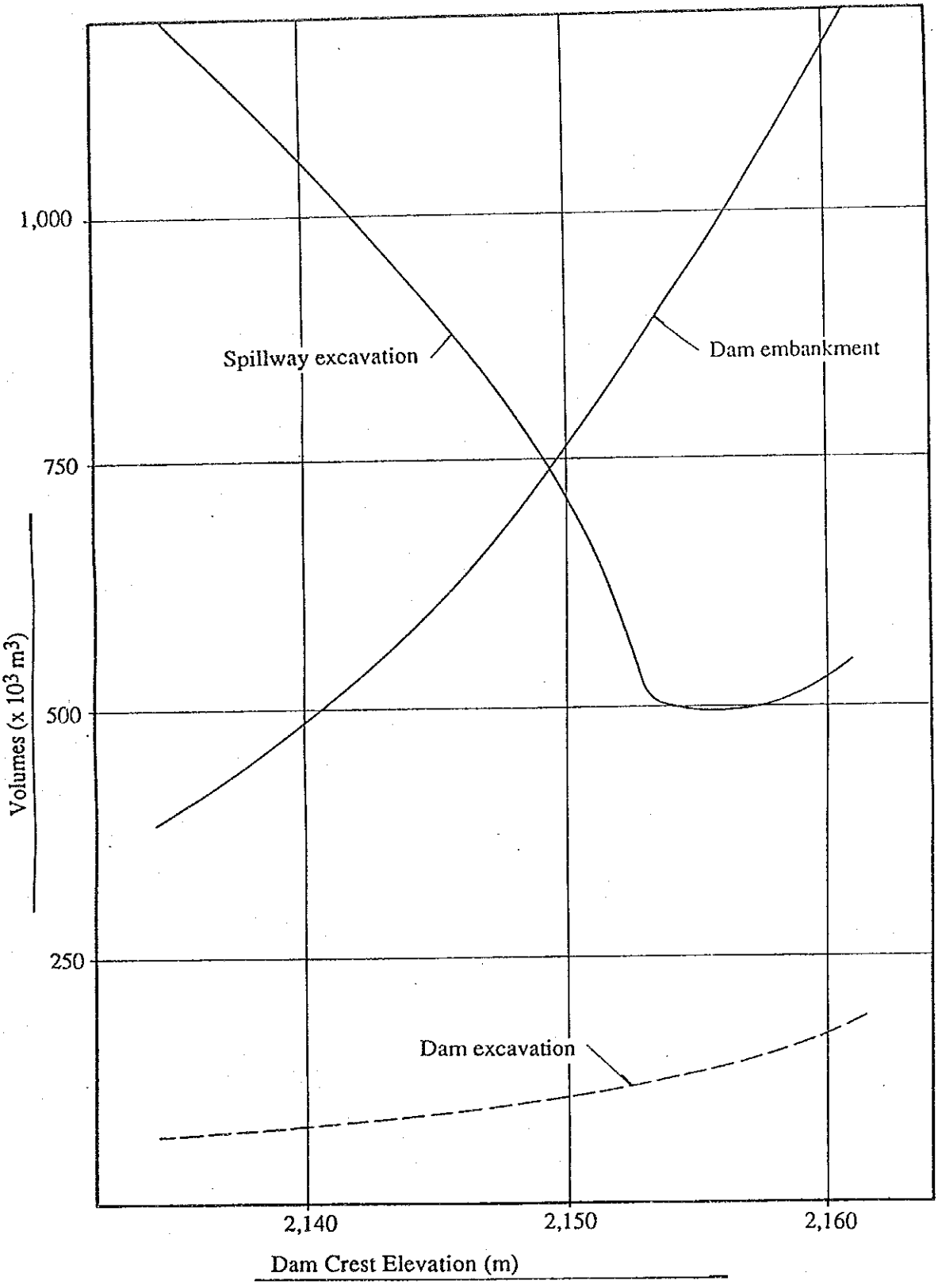
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE General Layout of Turasha Dam Scheme.

Fig. 4.9



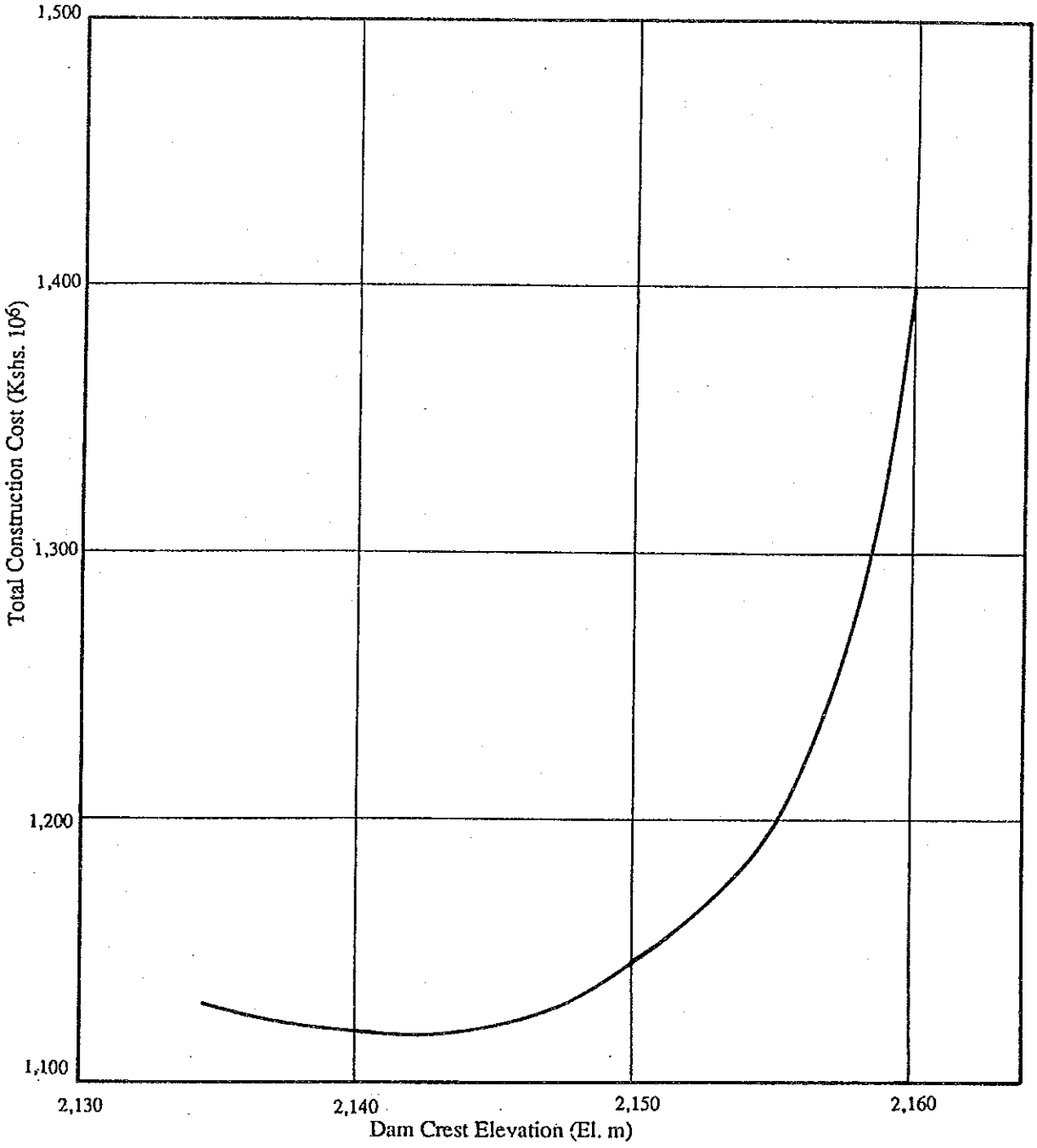
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Relationship between Active Storage Capacity and Water Supply Capacity

Fig. 4.10



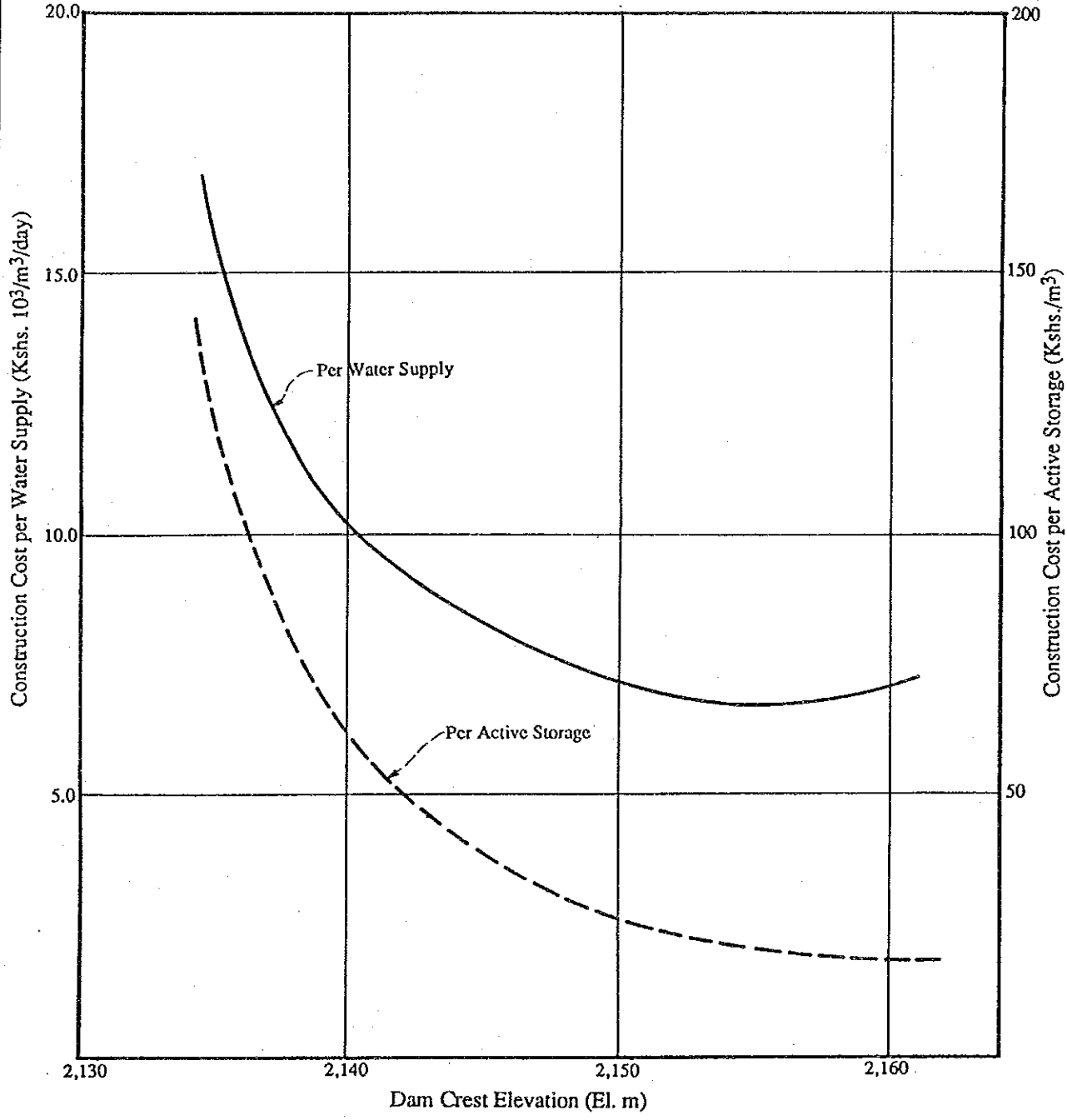
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Dam Excavation and Embankment Volumes and Spillway Excavation Volume

Fig. 4.11



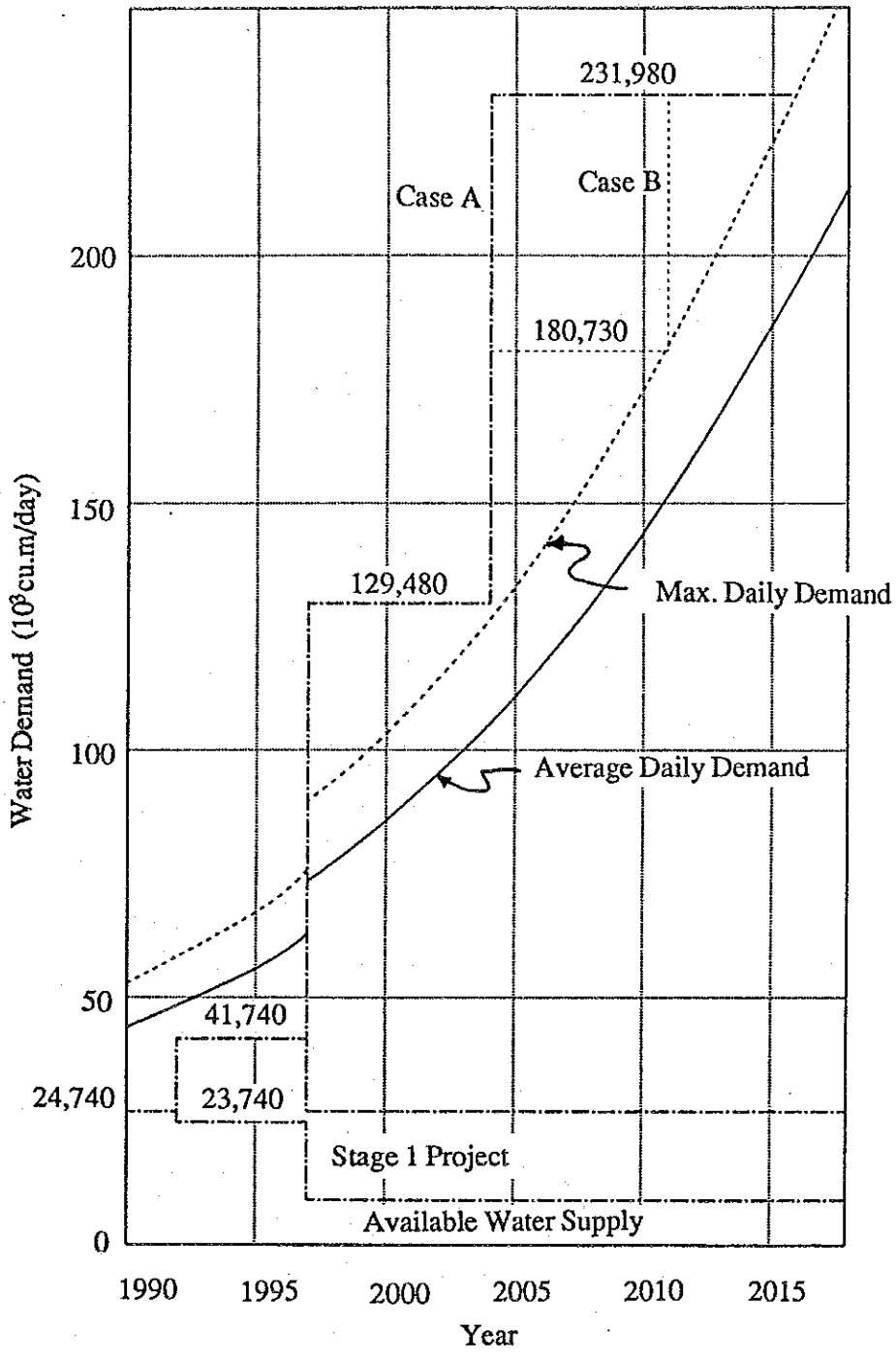
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Relationship between Dam Crest and Construction Cost

Fig. 4.12



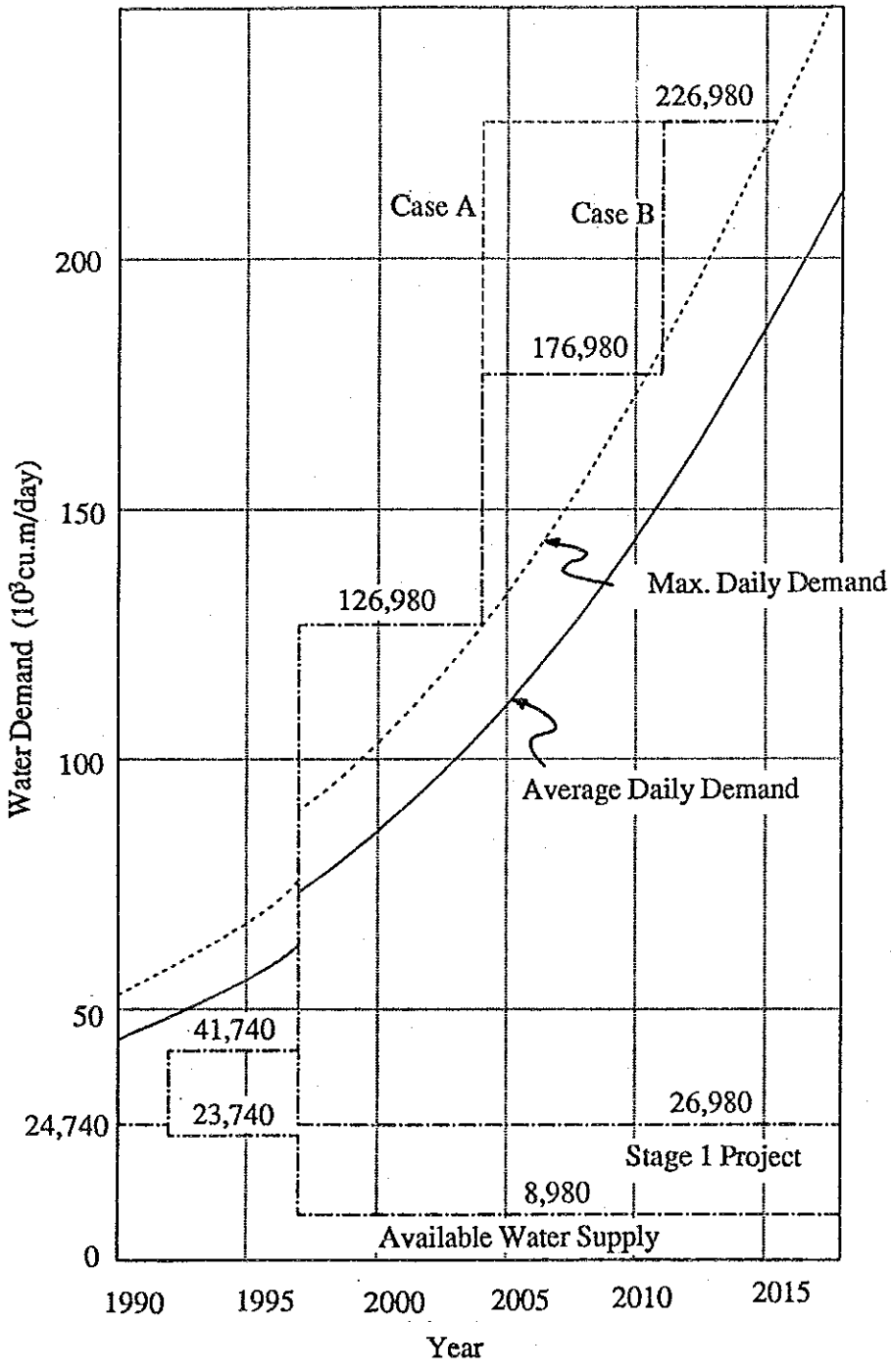
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Construction Cost per Water Supply and Construction Cost per Reservoir Active Storage

Fig. 4.13



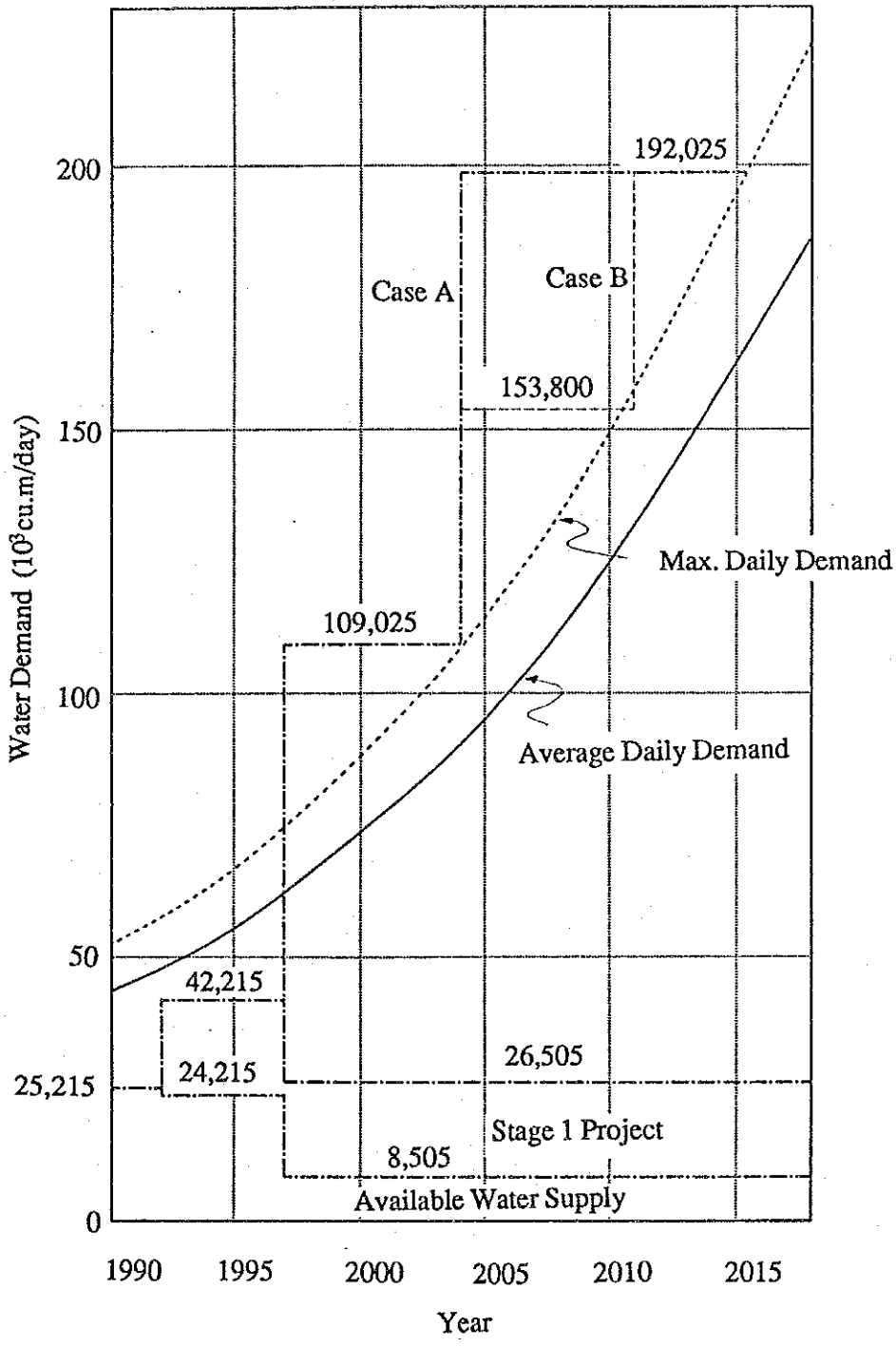
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Development Sequence of Raw Water Transmission System

Fig. 4.14



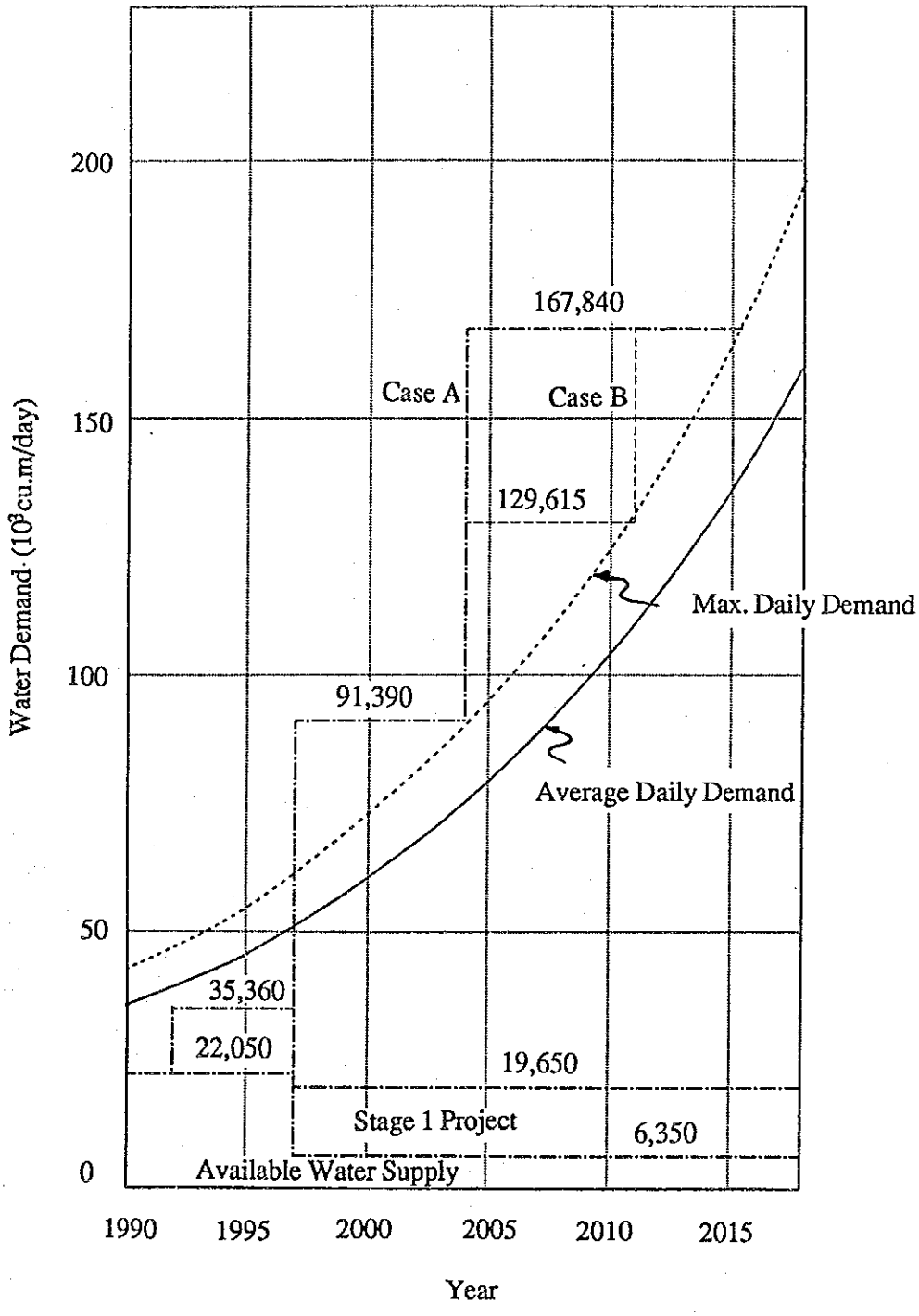
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Development Sequence of Treatment Works

Fig. 4.15 (1/2)



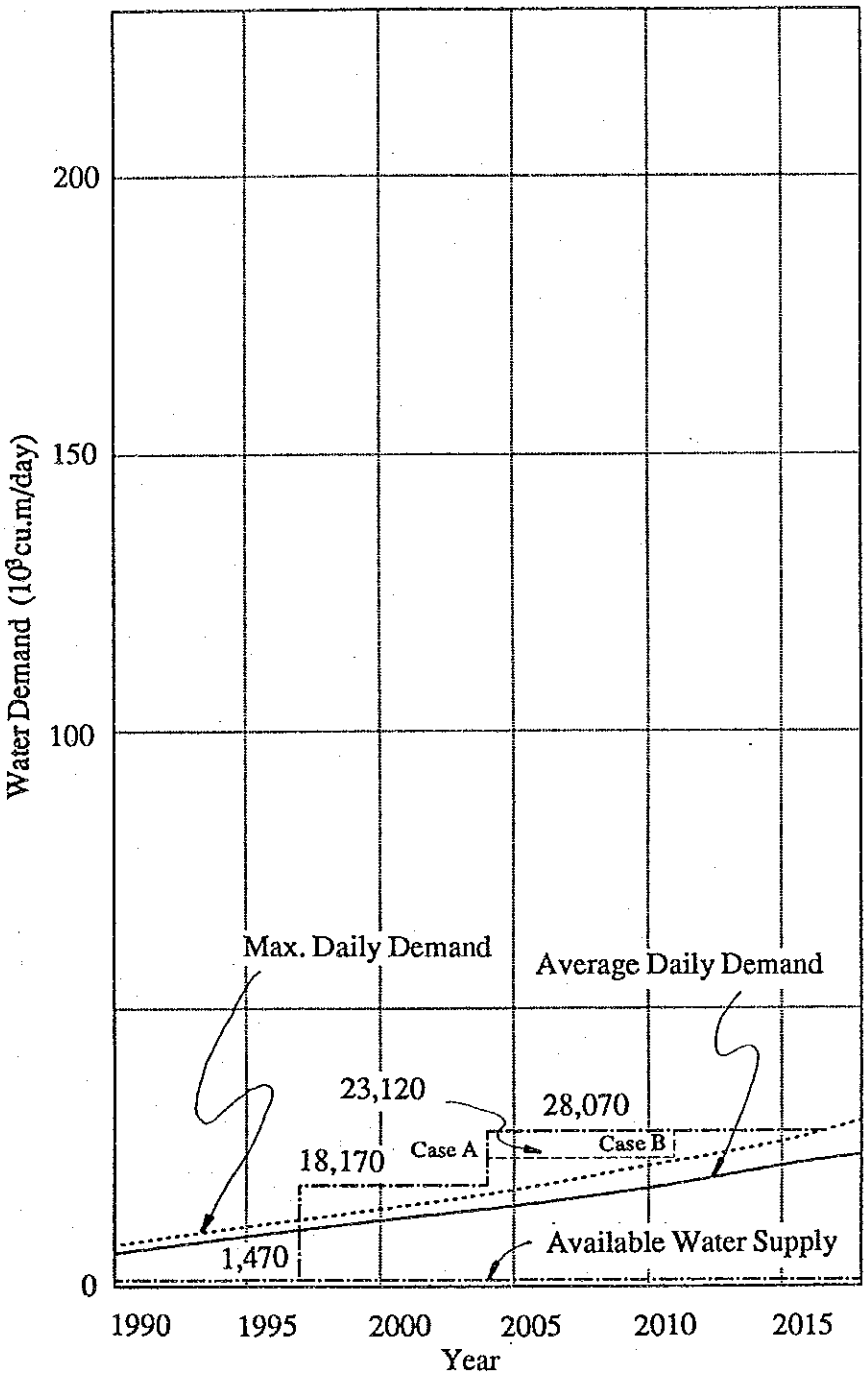
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Development Sequence of Nakuru Treated Water Transmission System Treatment Works-Gilgil

Fig. 4.15 (2/2)



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Development Sequence of Nakuru Treated Water Transmission System Gilgil-R6 reservoir

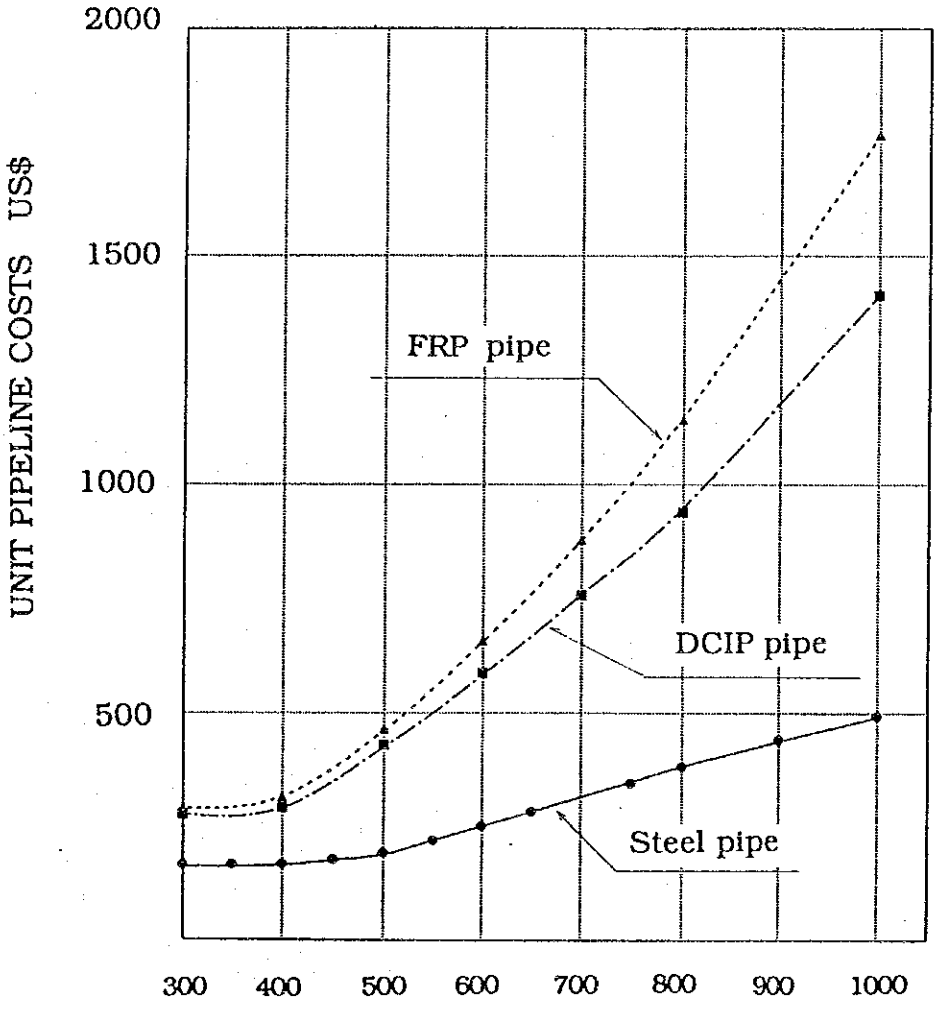
Fig. 4.16



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Development Sequence of Naivasha Treated Water Transmission System

Fig. 4.17

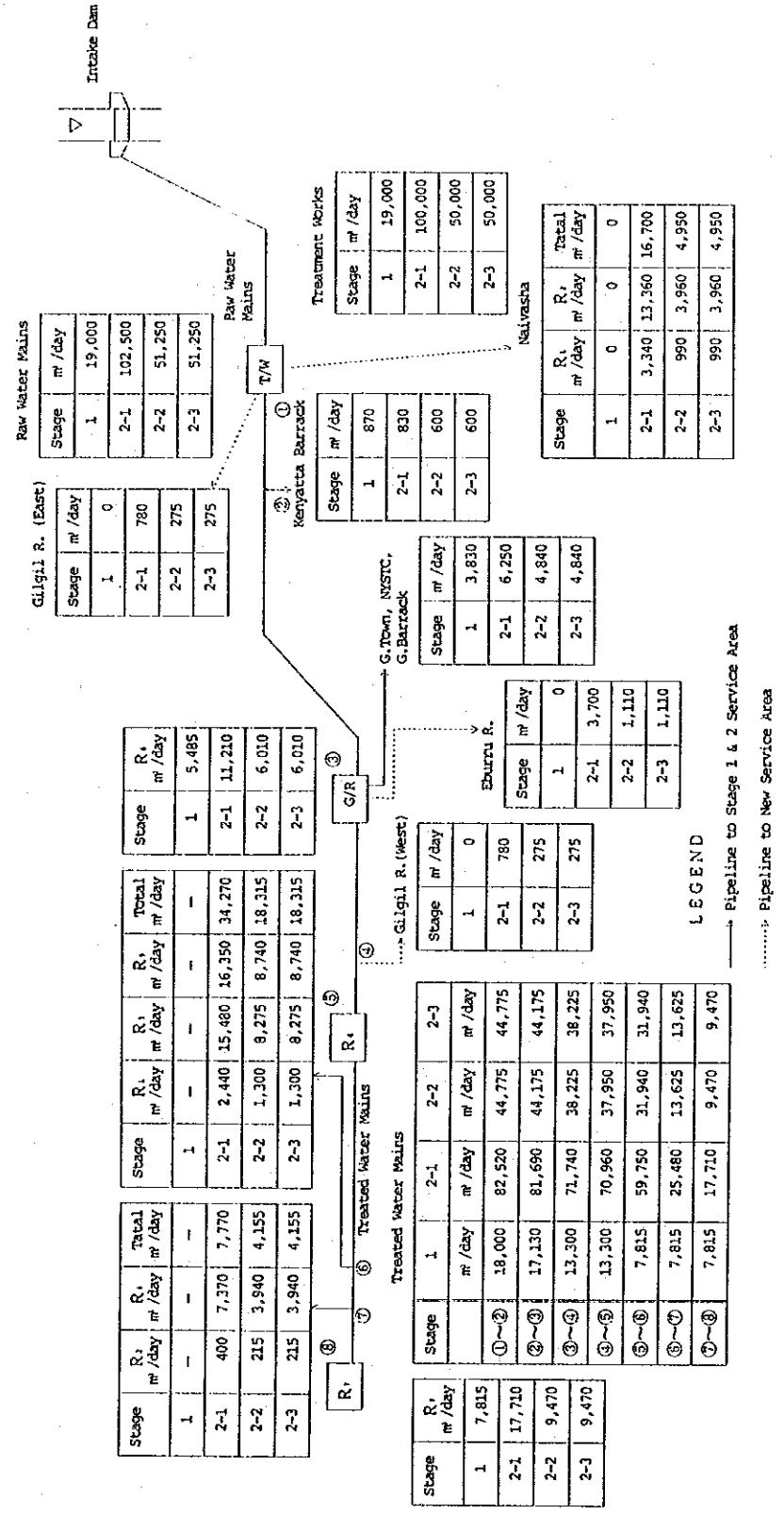
UNIT : PER 1m



Note: Working Pressure 20kg/sq.cm
FRP = Glass Fiber Reinforced Pipe
DCIP = Ductile Cast Iron Pipe

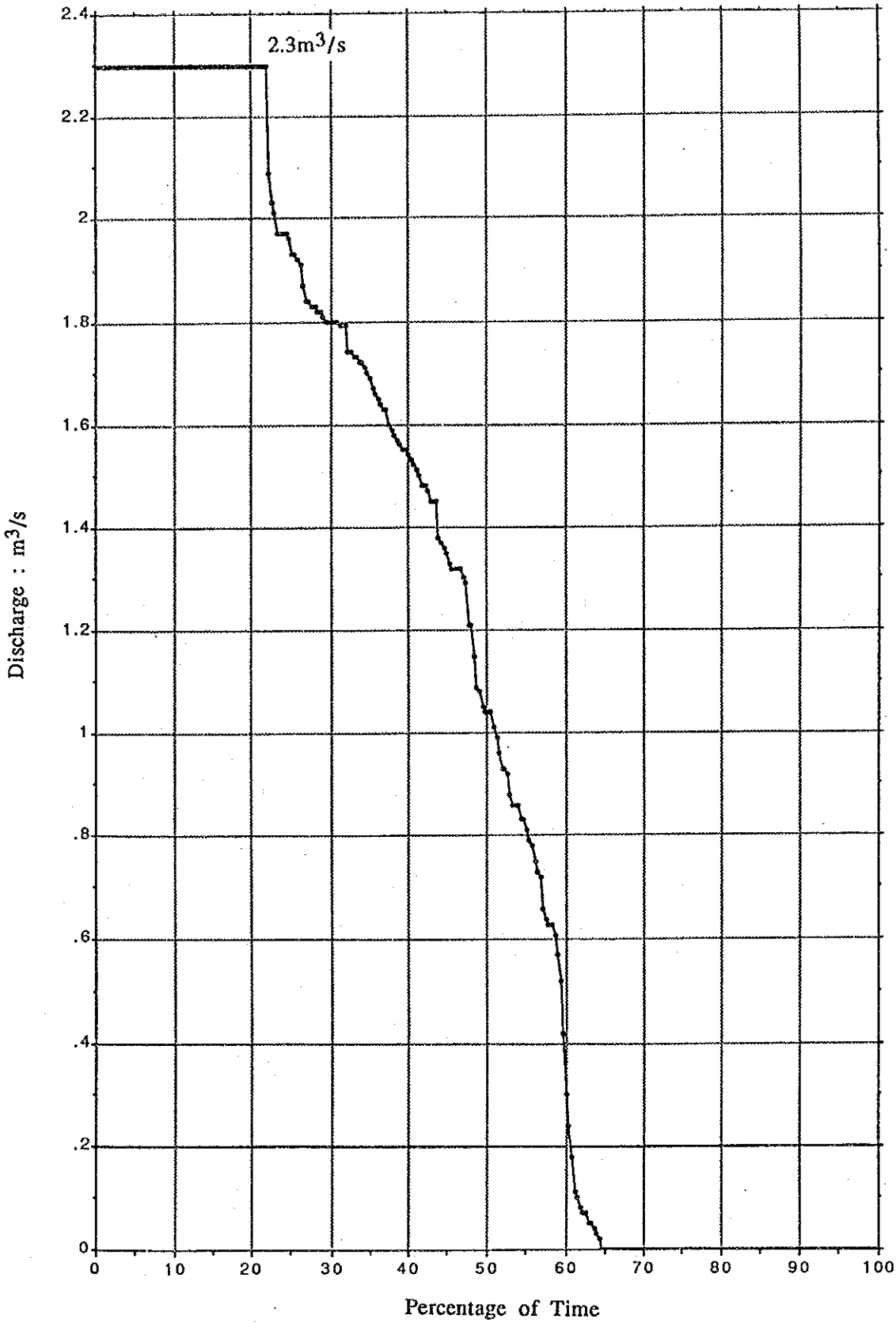
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Selection of Pipe Materials

Fig. 4.18



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Schematic Diagram of Water Allotment

Fig. 4.19



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Flow Duration Curve of Water Diverted to Turasha River

Fig. 5.1

LEGEND

QUATERNARY (RECENT)

- col — Colluvium
- rbs — Riverbed sediments

UPPER TERTIARY (PLOCENE)

Kinangop Tuffs

- Nwu — Upper non-welded layer
- Wlf — Welded tuff
- Nwl — Lower non-welded layer
- Tuf — Massive tuffs
- Lsd — Lake sediments

- Lithologic boundary
- Defined fault
- Inferred fault

0 500 1,000m

THE REPUBLIC OF KENYA

MINISTRY OF WATER DEVELOPMENT

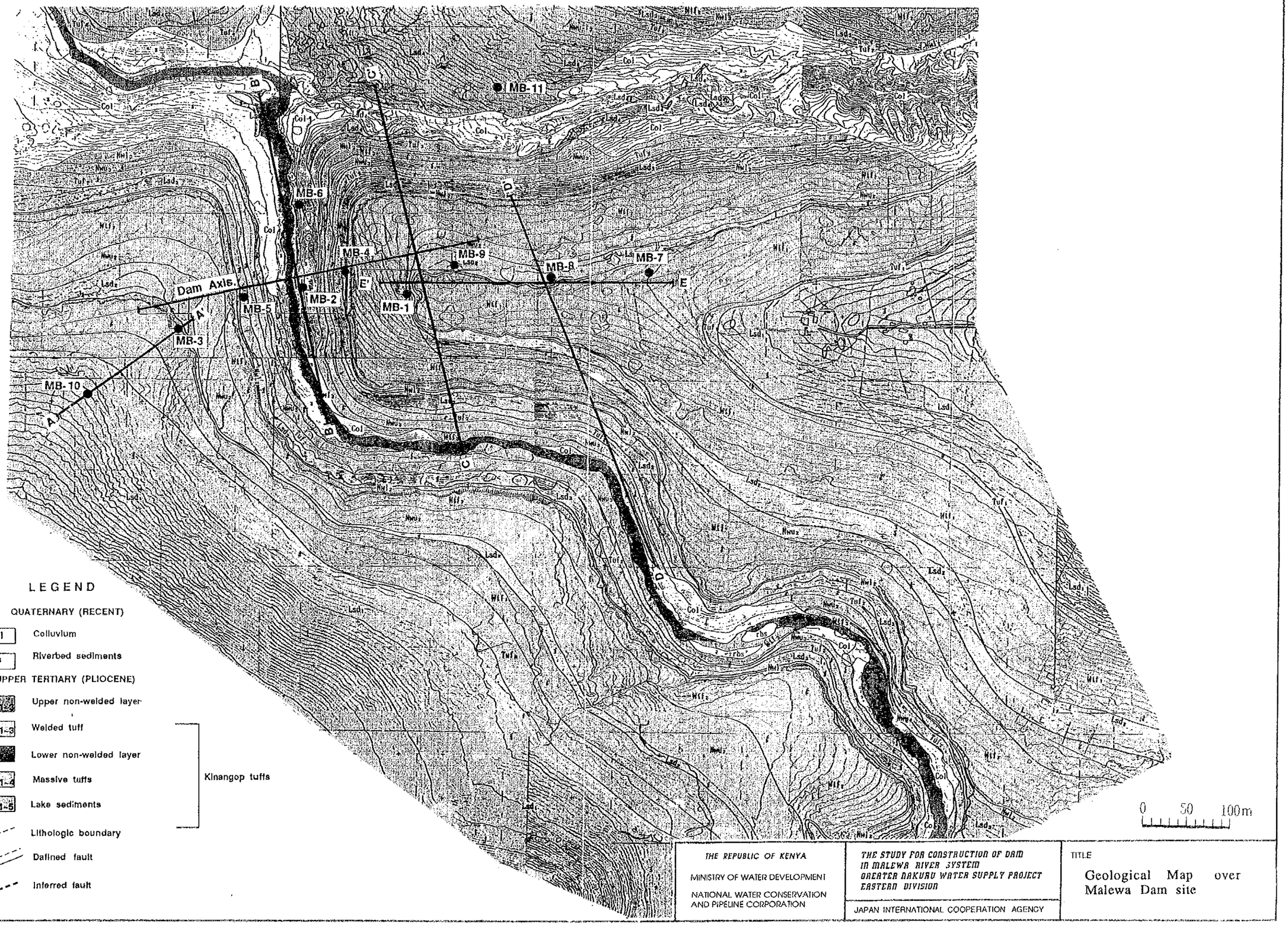
NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION

THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION

JAPAN INTERNATIONAL COOPERATION AGENCY

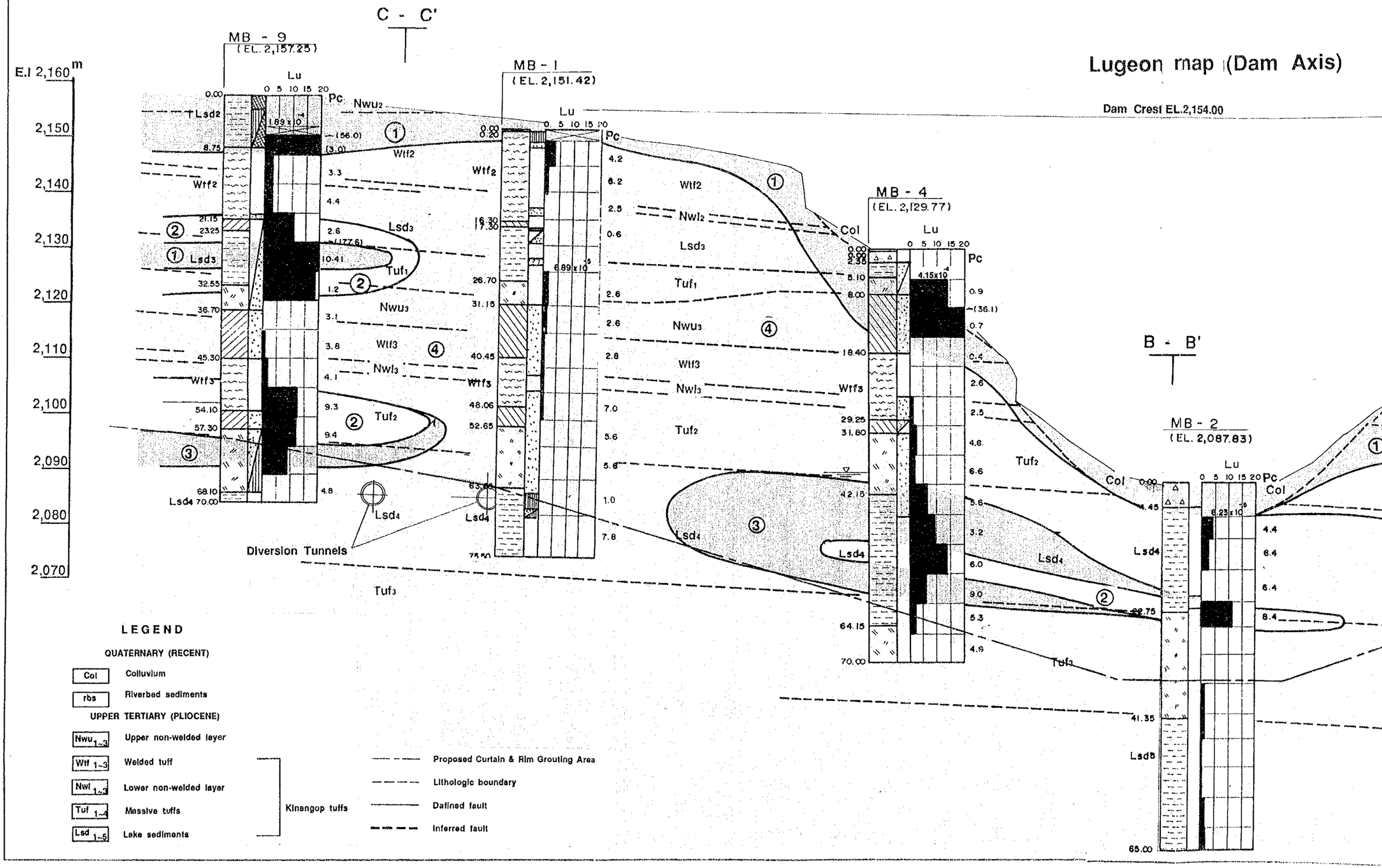
TITLE

Geological Map over Malewa and Turasha Reservoirs


MB-11
MB-6
MB-4
MB-9
MB-7
MB-8
MB-2
MB-1
MB-5
MB-3
MB-10
Dam Axis.
A
A'
B
B'
C
C'
D
D'
E
E'
LEGEND
QUATERNARY (RECENT)
Col Colluvium
rbs Riverbed sediments
UPPER TERTIARY (PLIOCENE)
Upper non-welded layer
Welded tuff
Lower non-welded layer
Massive tuffs
Lake sediments
Kinangop tuffs
Lithologic boundary
Defined fault
Inferred fault
0 50 100m
THE REPUBLIC OF KENYA
MINISTRY OF WATER DEVELOPMENT
NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION
THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION
JAPAN INTERNATIONAL COOPERATION AGENCY
TITLE
Geological Map over Malewa Dam site

Lugeon map (Dam Axis)

Dam Crest EL.2,154.00



LEGEND

QUATERNARY (RECENT)

- Col — Colluvium
- rbs — Riverbed sediments

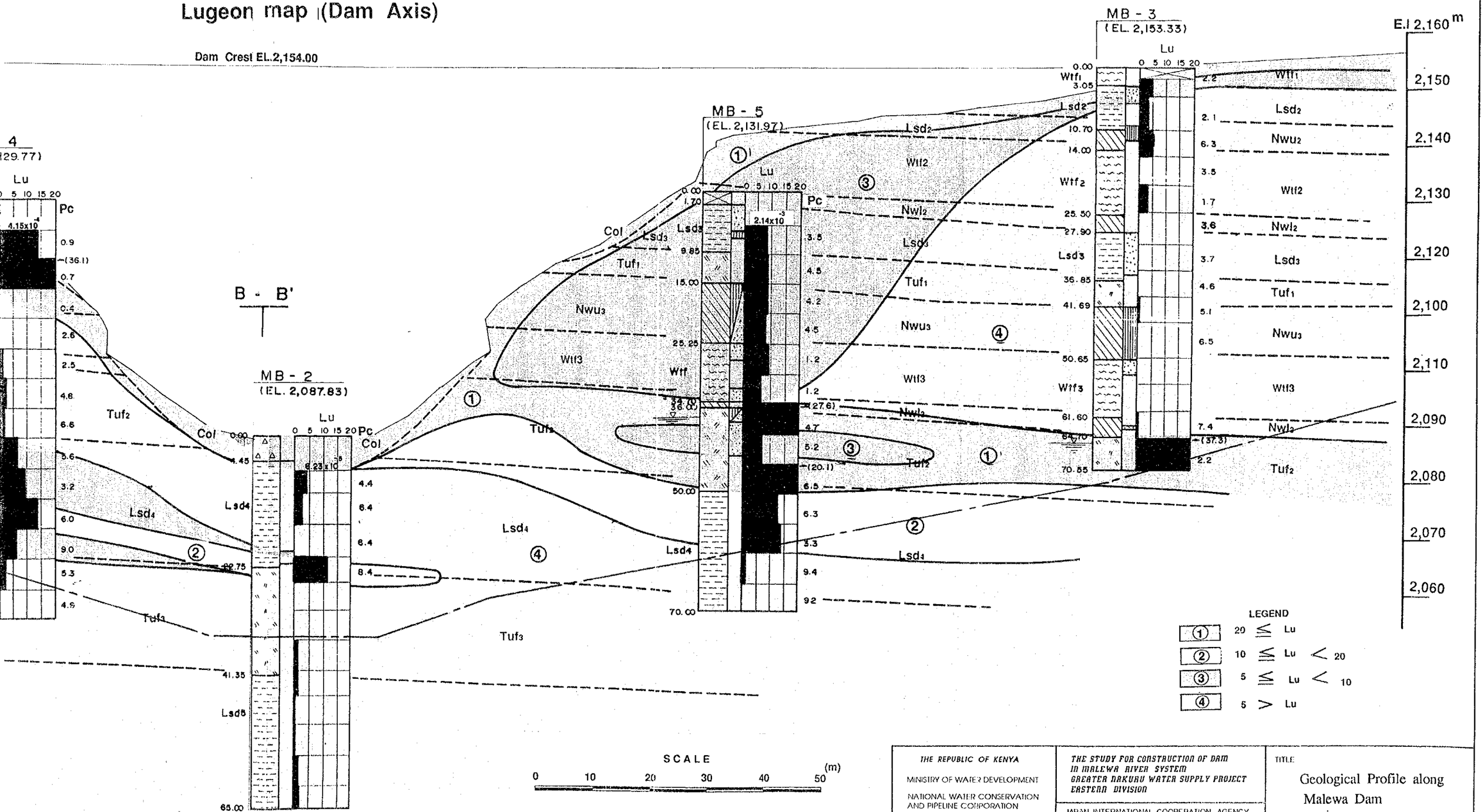
UPPER TERTIARY (PLIOCENE)

- $Nwu_{1\sim3}$ — Upper non-welded layer
- $Wtf_{1\sim3}$ — Welded tuff
- $Nwl_{1\sim3}$ — Lower non-welded layer
- $Tuf_{1\sim4}$ — Massive tuffs
- $Lsd_{1\sim5}$ — Lake sediments

Kinangop tuffs

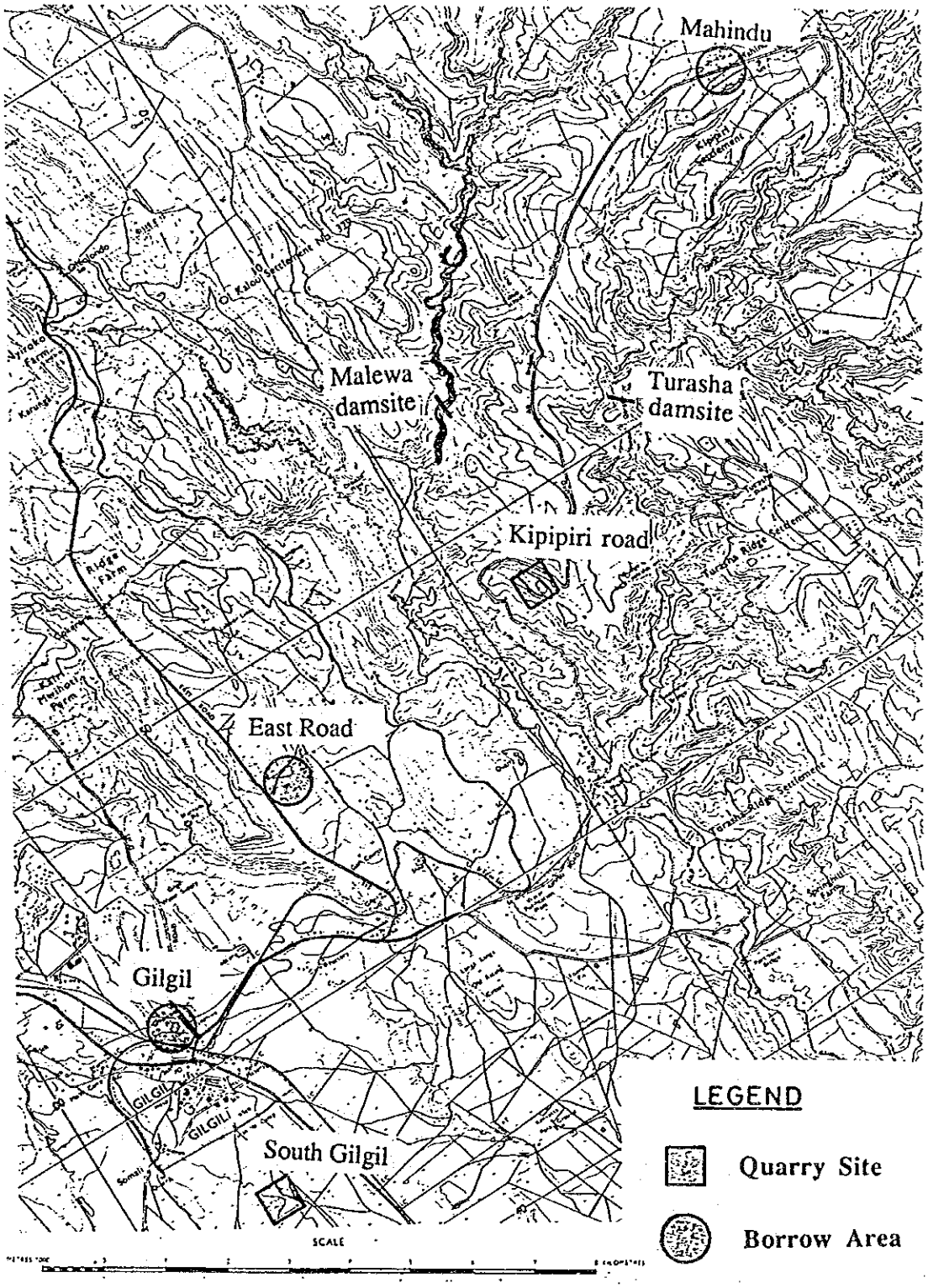
- Proposed Curtain & Rim Grouting Area
- Lithologic boundary
- Dafined fault
- Inferred fault

Lugeon map (Dam Axis)



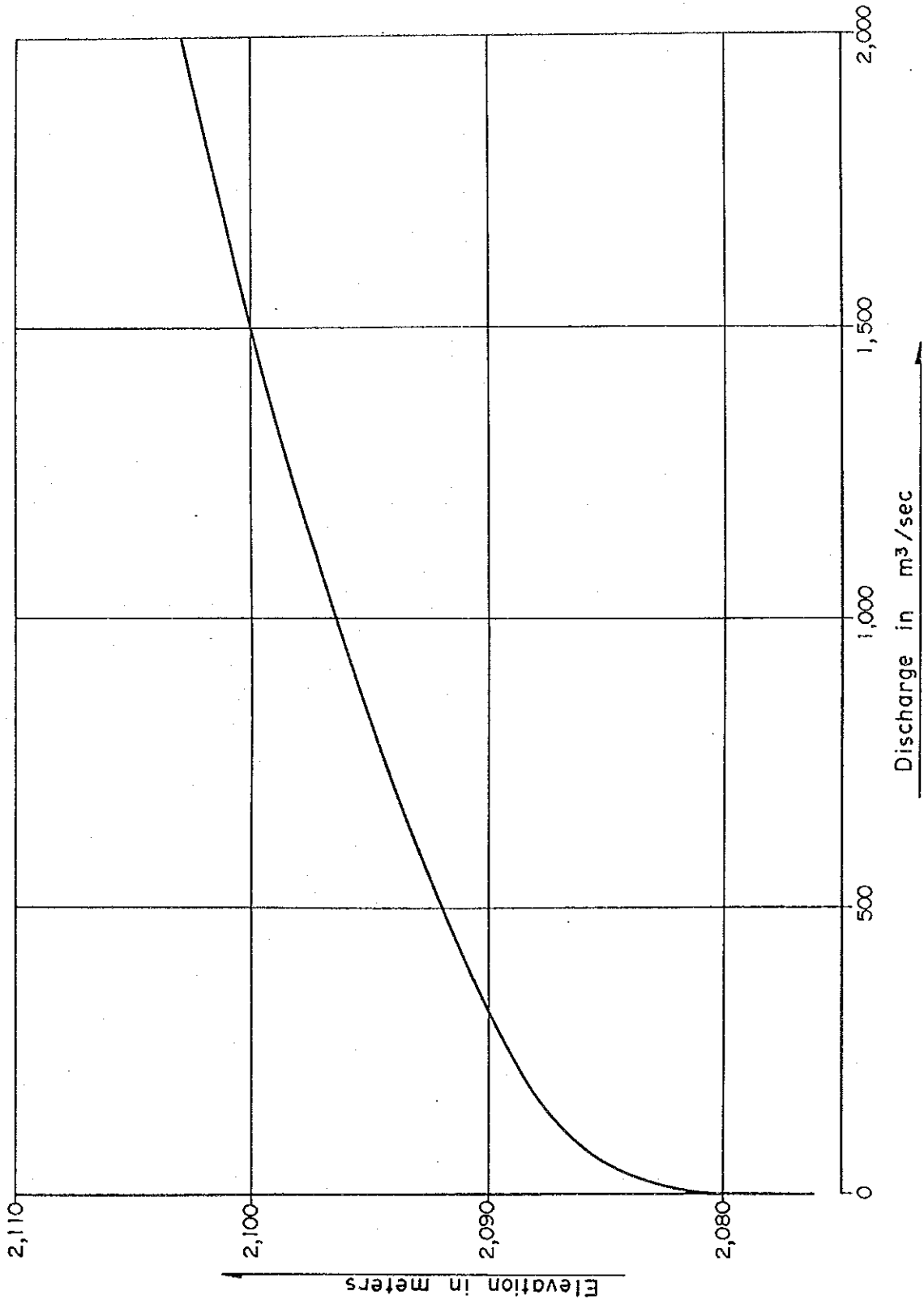
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Geological Profile along Malewa Dam

Fig. 5.4



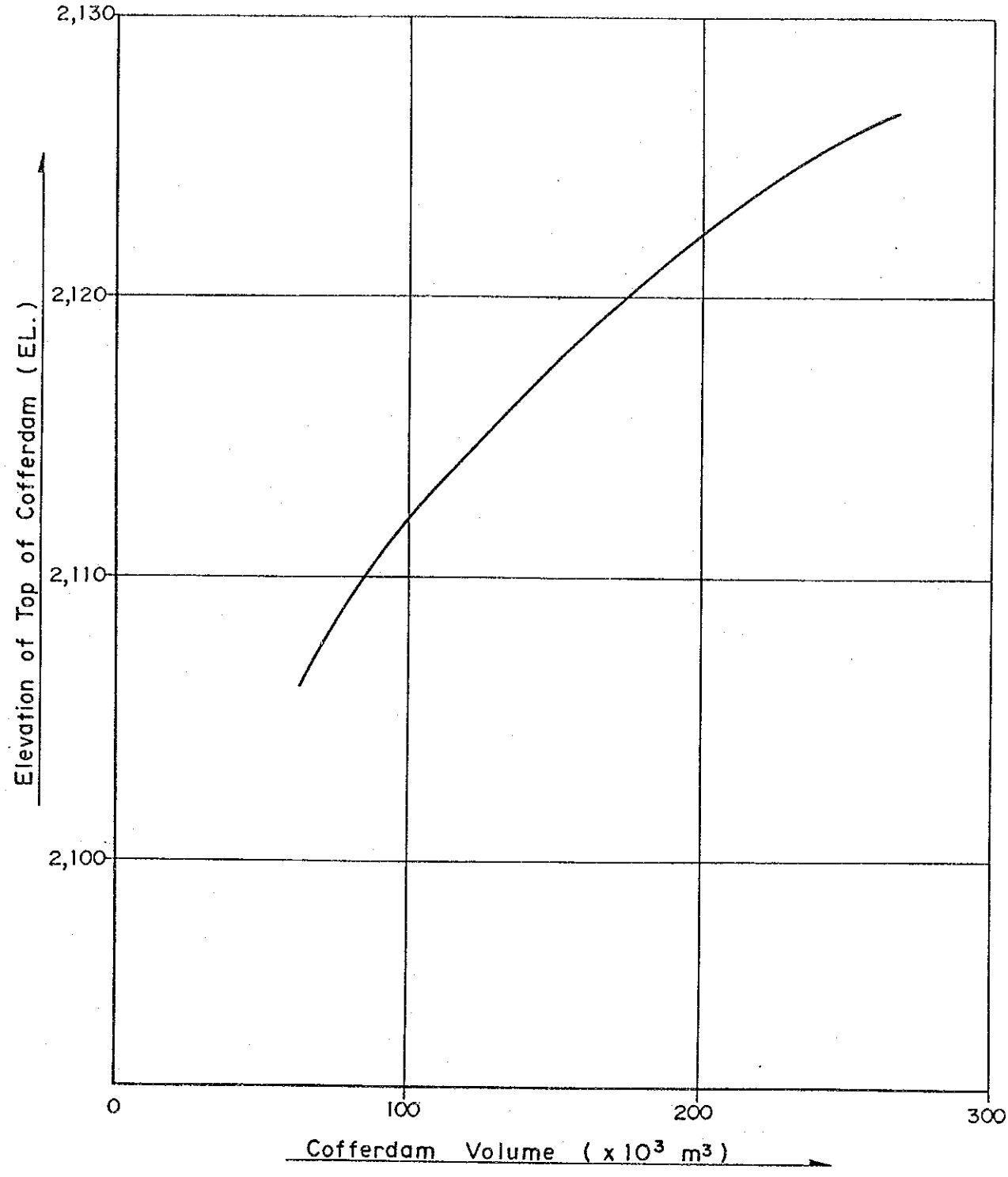
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Location of Borrow Areas and Quarry Sites

Fig. 5.5



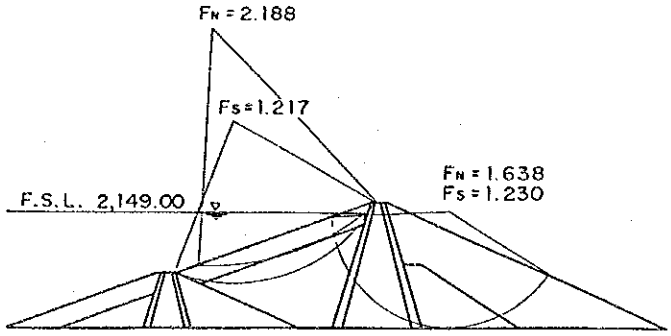
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Stage - Discharge Relation at Malewa Dam Site

Fig. 5.6

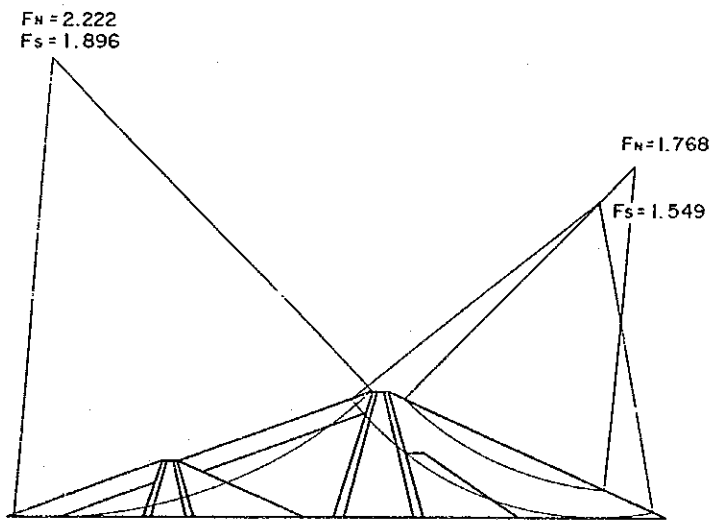


THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Embankment Volume of Coffer Dam

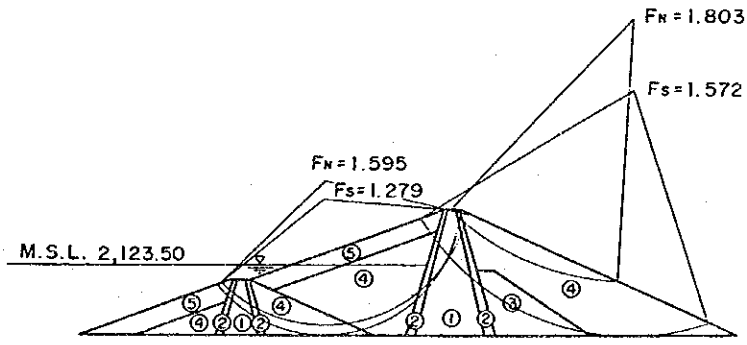
Fig. 5.7



Case (1) Reservoir water level at F.S.L.



Case (2) Just after completion of dam
(Reservoir empty)



Case (3) Rapid drawdown

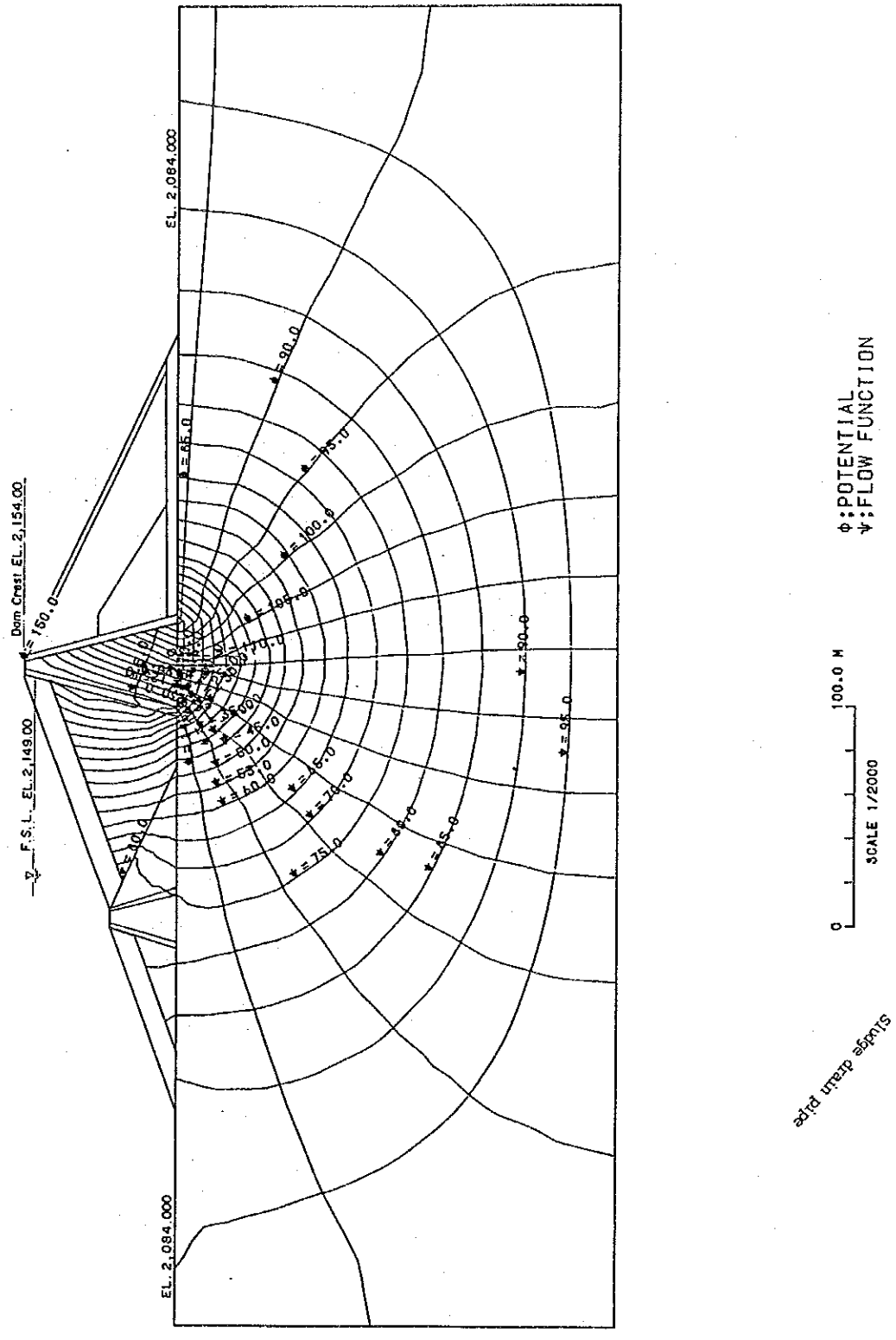
Zone ① Core ④ Outer shell - 1
② Filter ⑤ Outer shell - 2
③ Inner shell

Scale 0 150.0m

Notes;
FN : Safety factor in normal
Fs : Safety factor in seismic

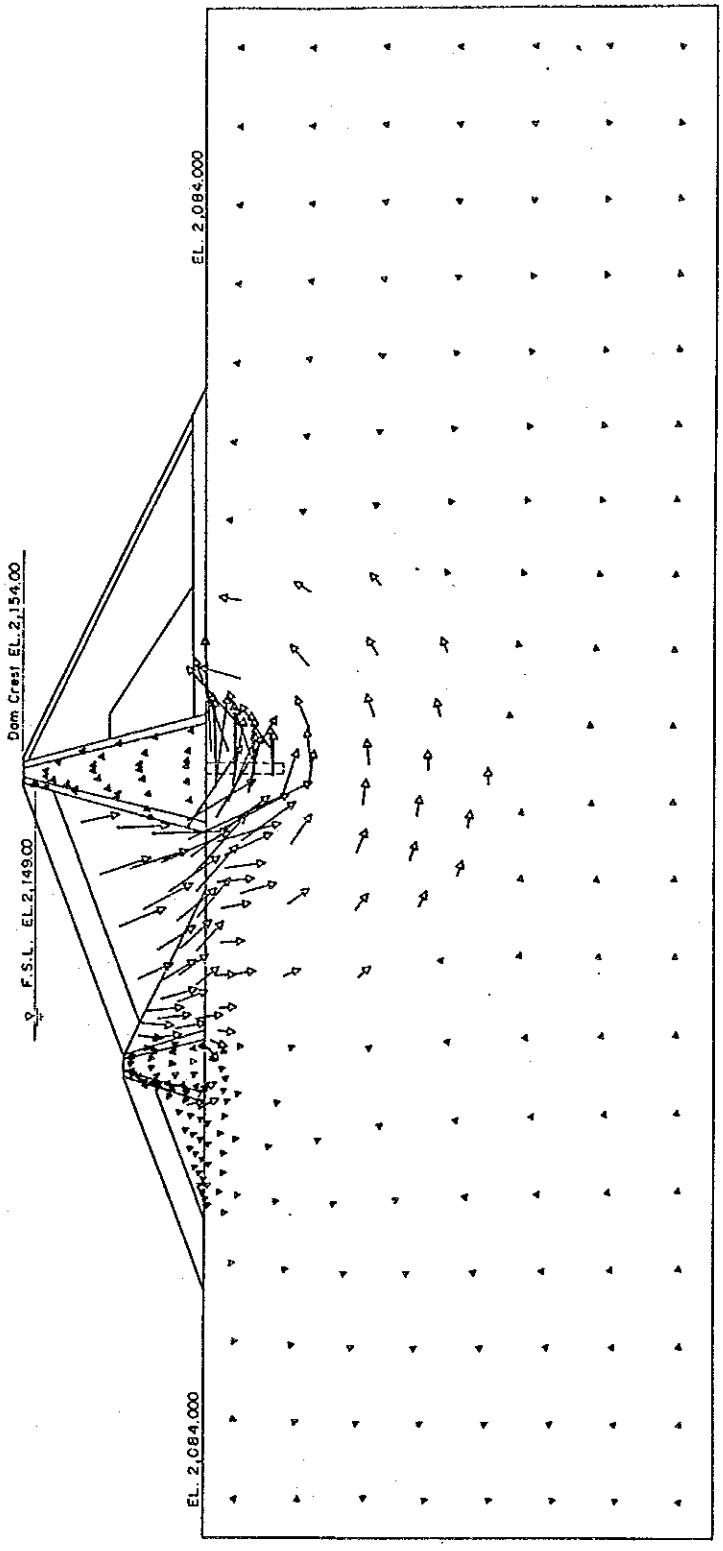
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Analysis of Slip Circle Method

Fig. 5.8



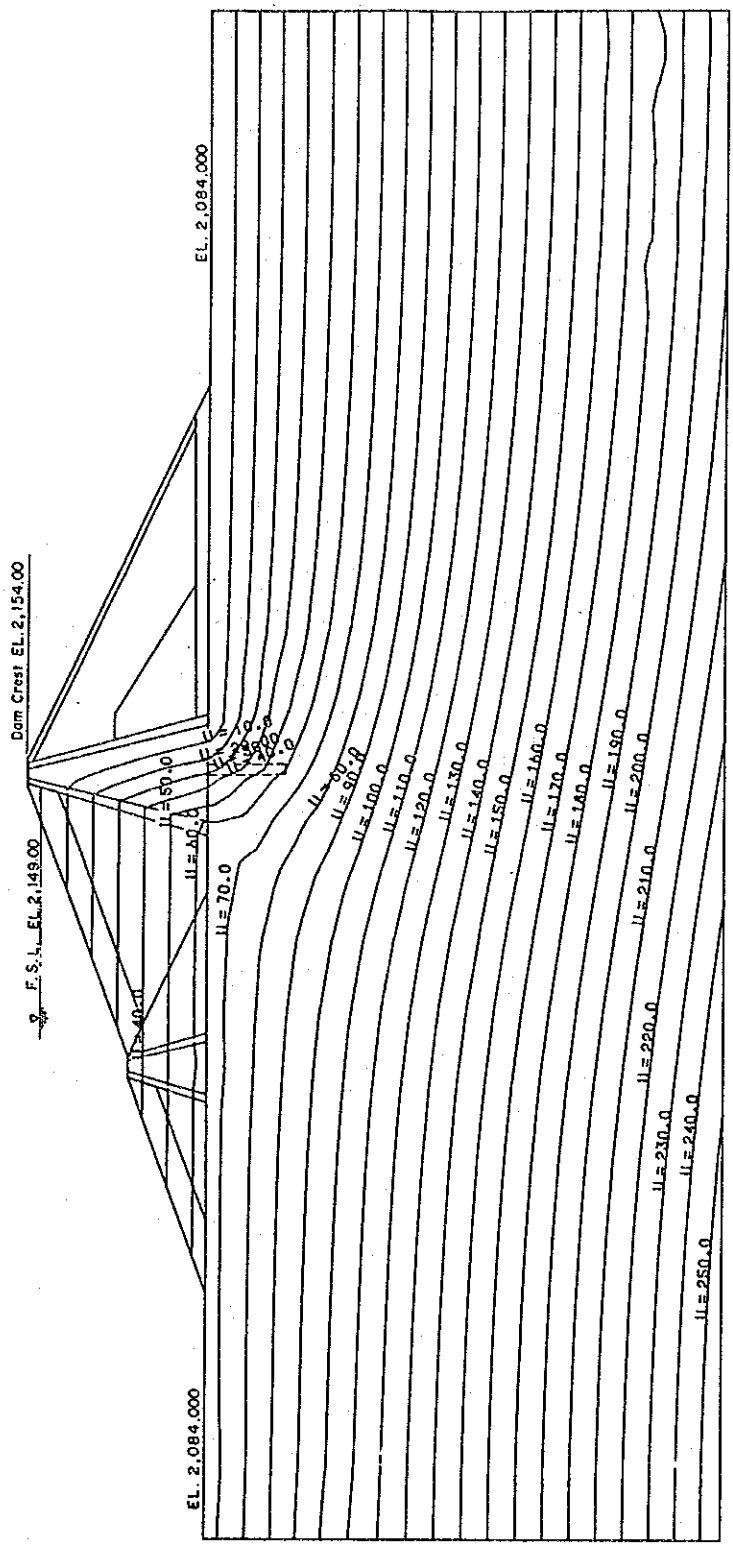
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Seepage Analysis of Main Dam

Fig. 5.9



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Seepage Analysis of Main Dam

Fig. 5.10



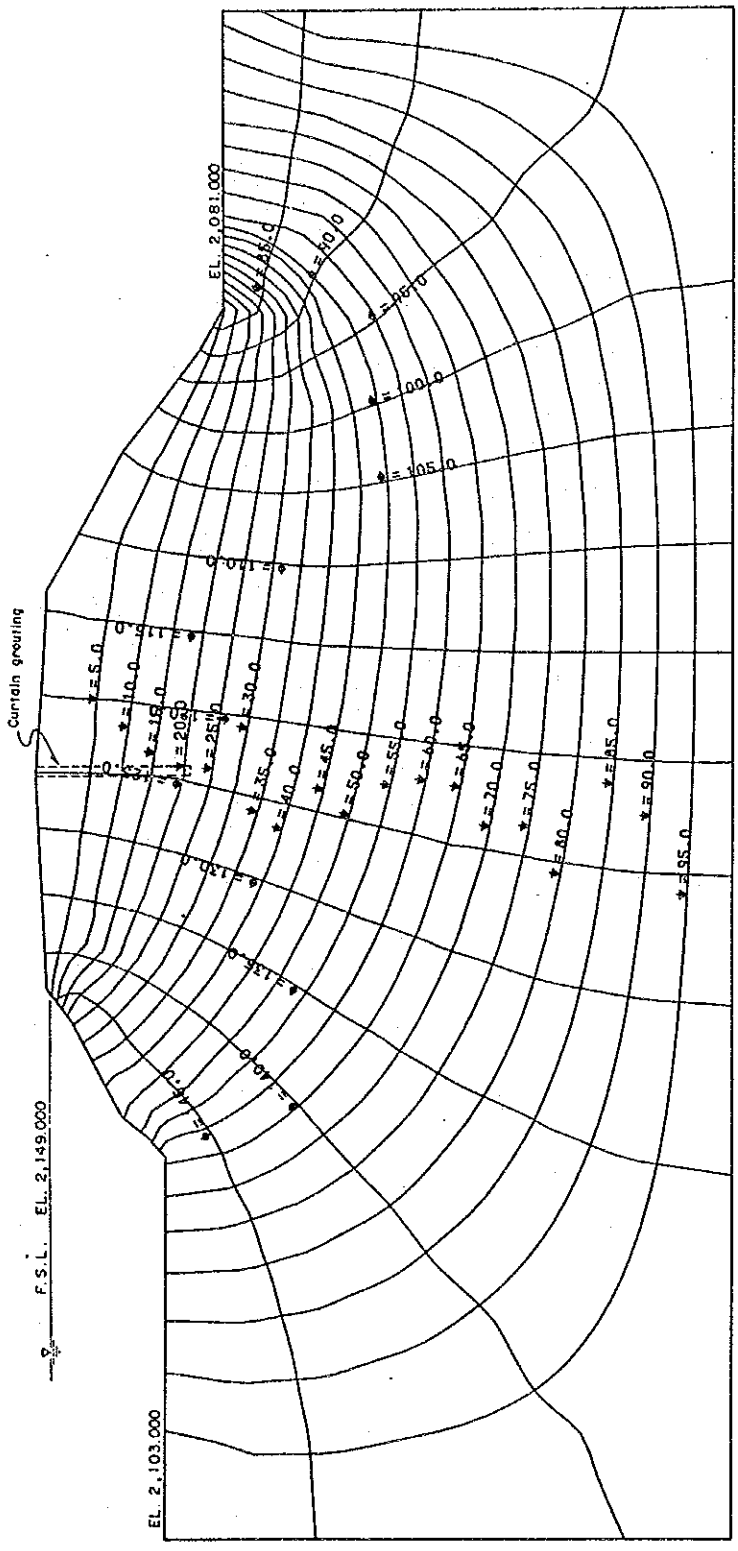
U:PRESSURE HEAD

0 100.0 M

SCALE 1/2000

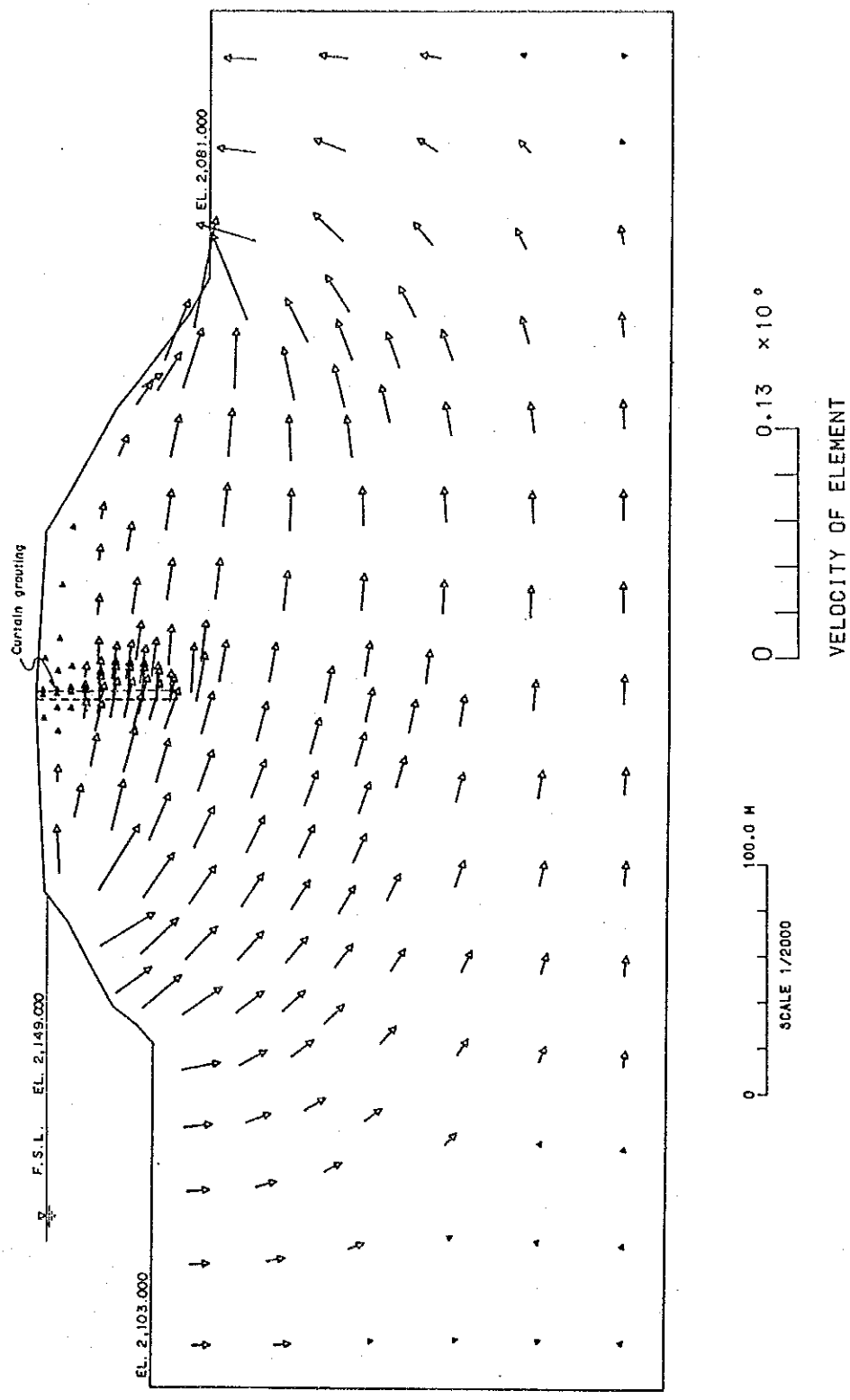
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Seepage Analysis of Main Dam

Fig. 5.11



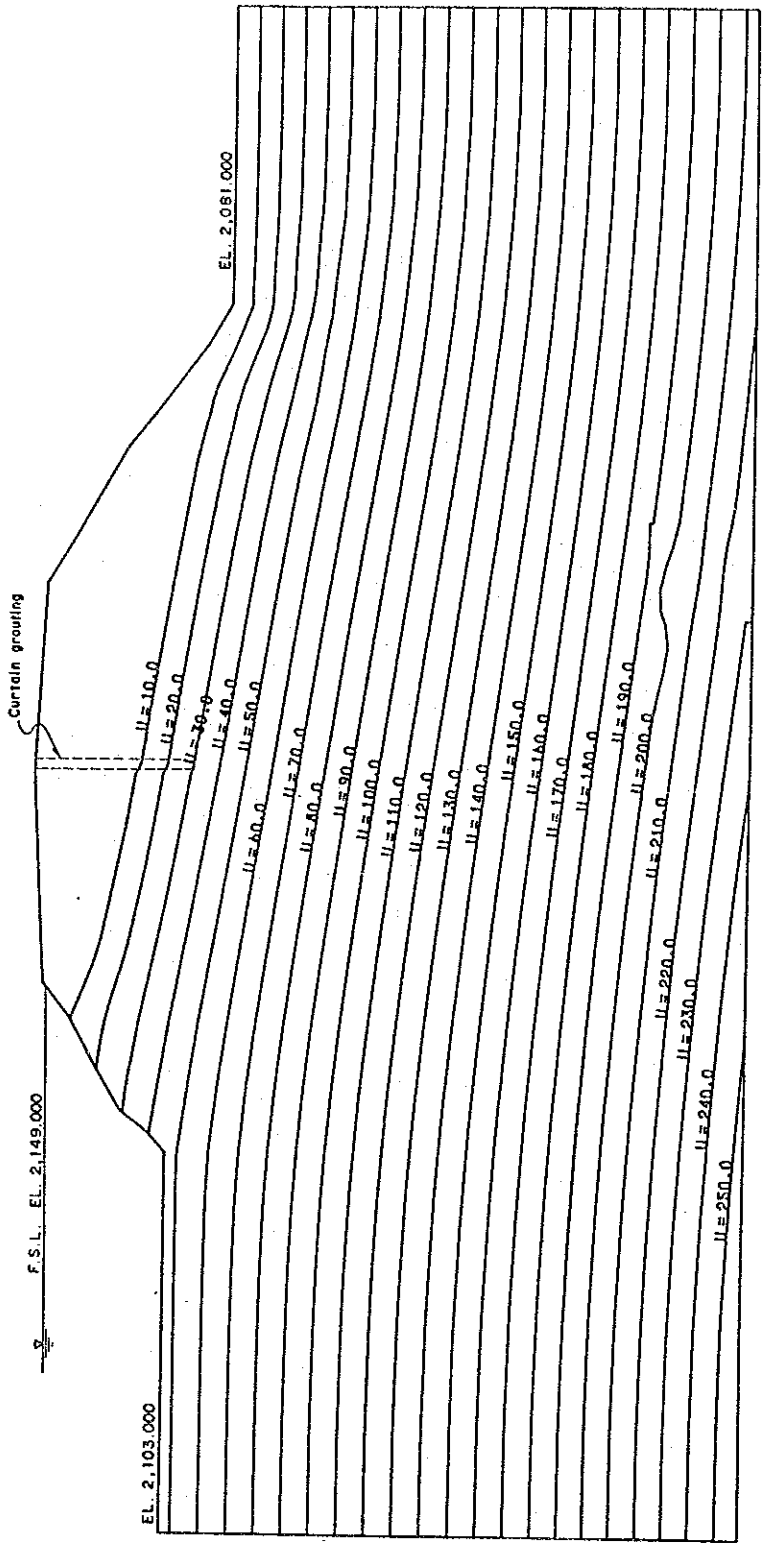
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Seepage Analysis of Main Dam

Fig. 5.12



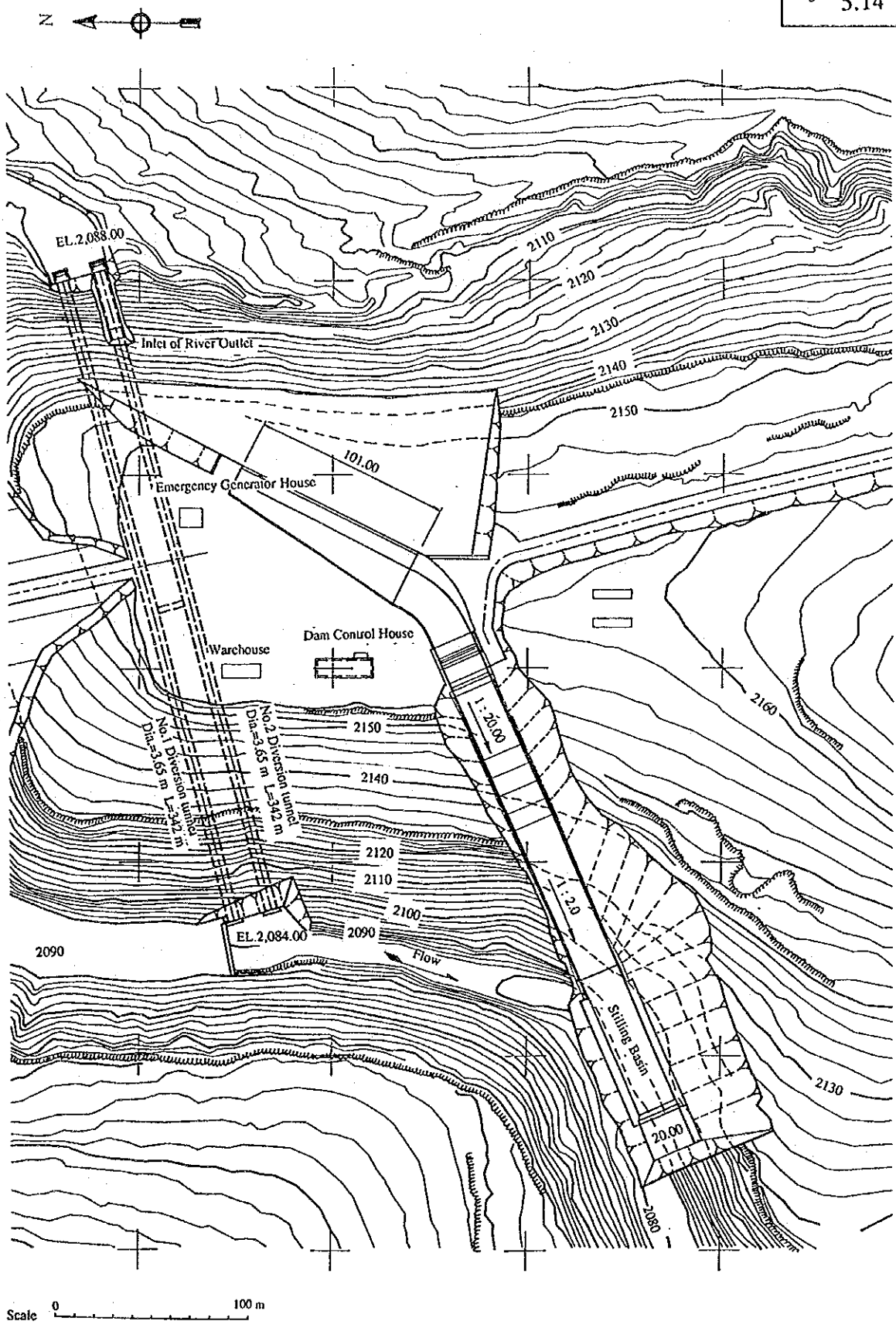
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Seepage Analysis of Main Dam

Fig. 5.13



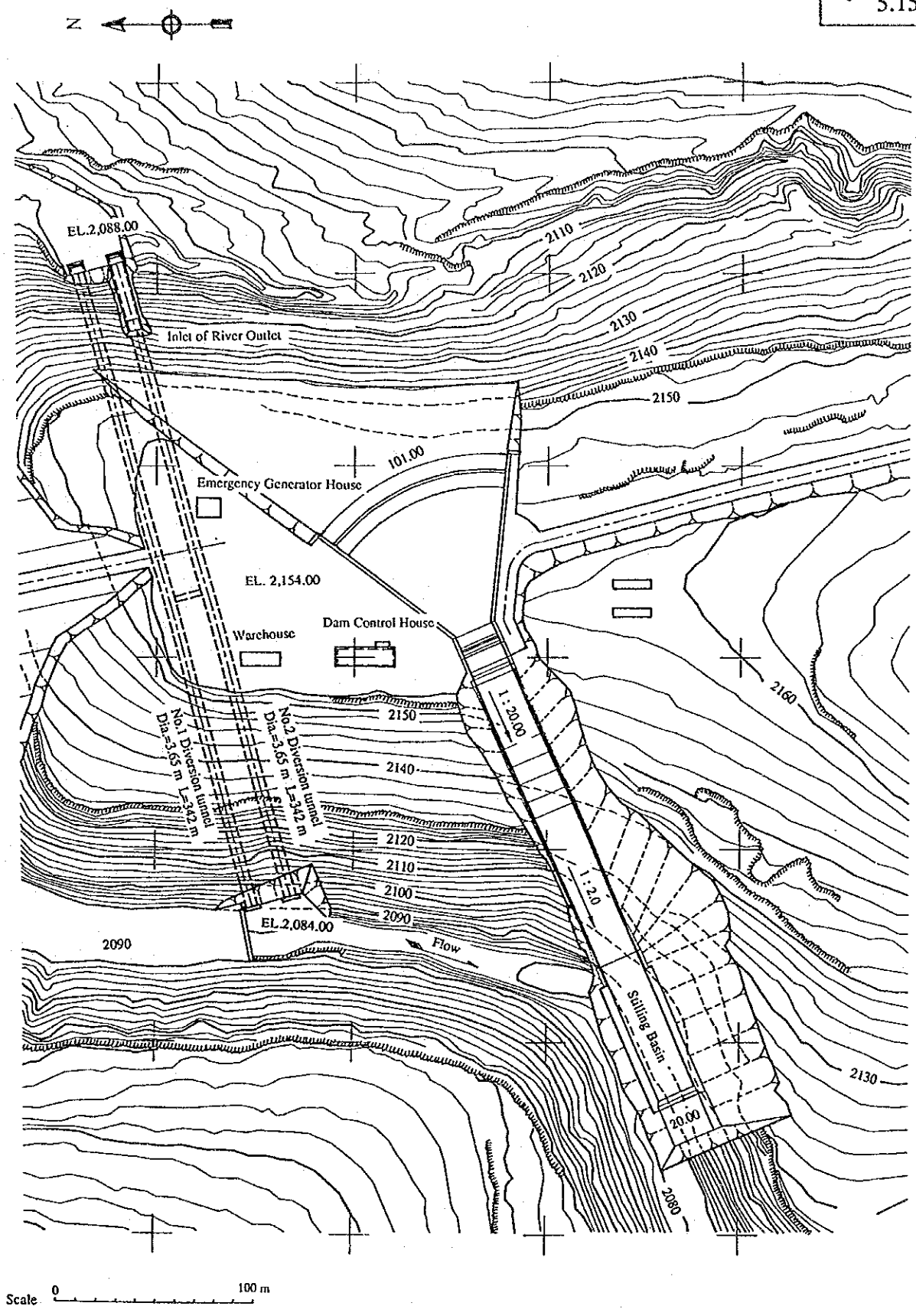
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Seepage Analysis of Main Dam

Fig. 5.14



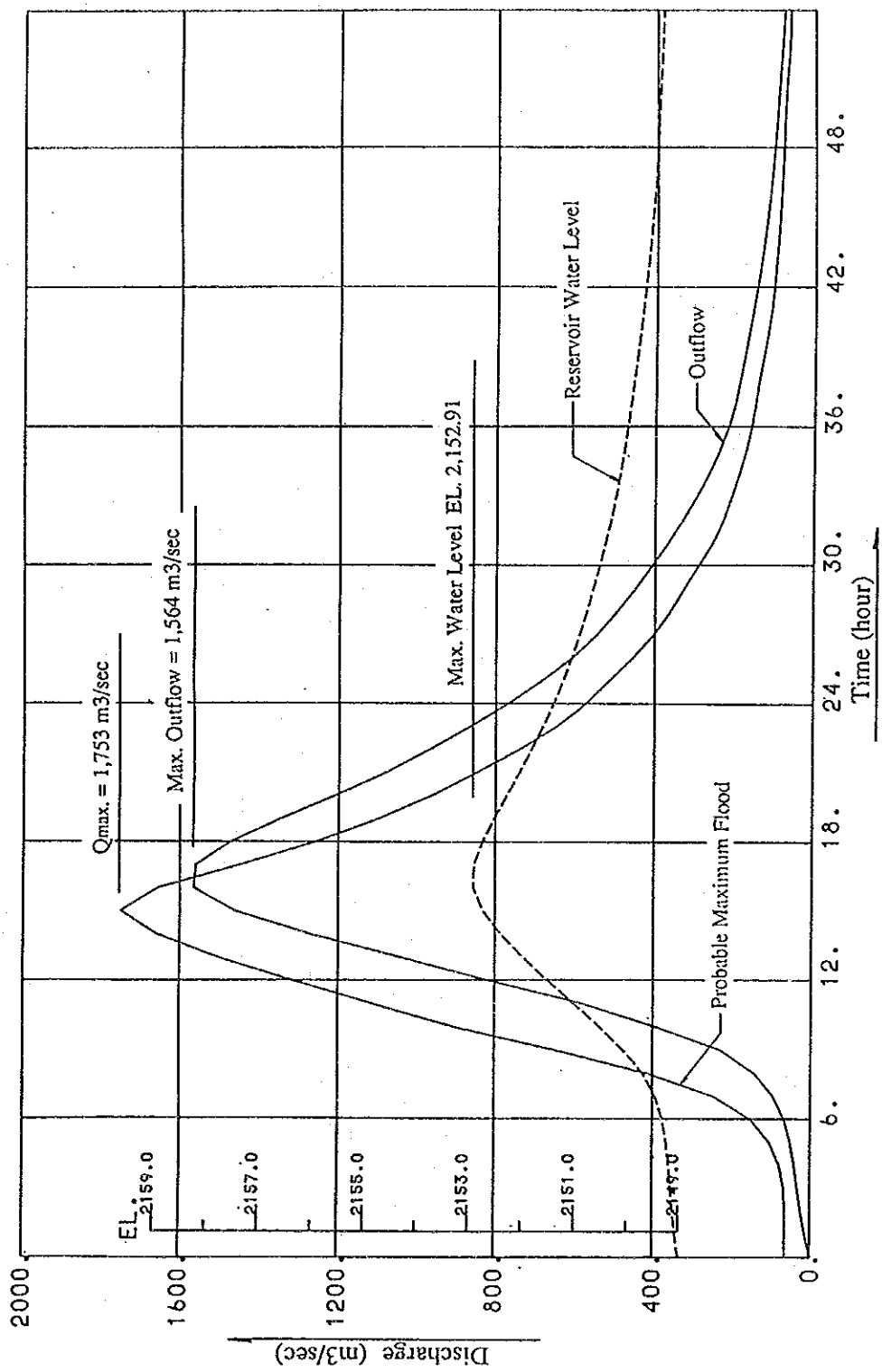
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Side Spillway Shape

Fig. 5.15



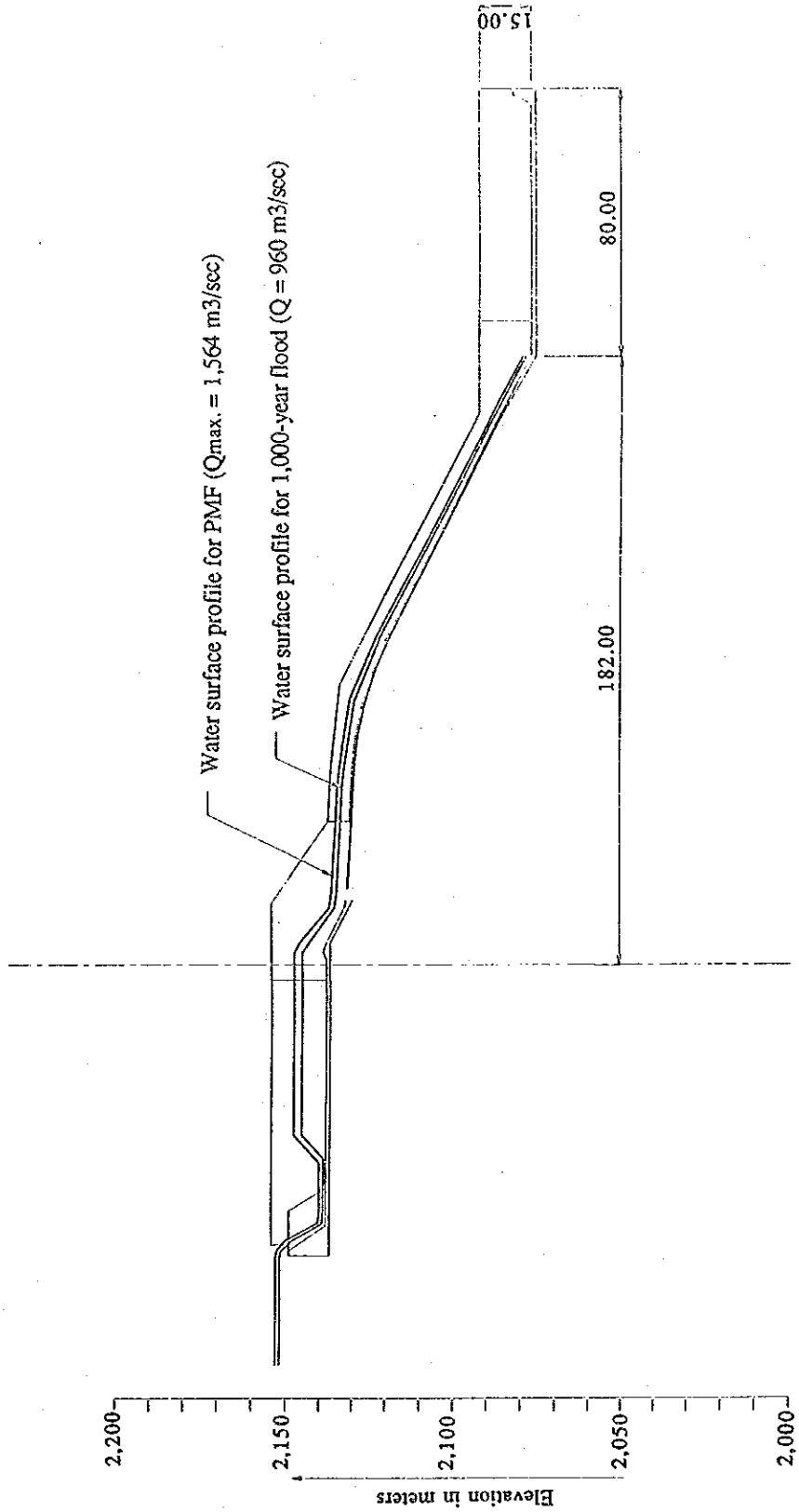
THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Fan-shaped spillway

Fig. 5.16



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Flood Routing Study of Spillway

Fig. 5.17



THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Designed Chuteway

Fig. 5.18

THE REPUBLIC OF KENYA MINISTRY OF WATER DEVELOPMENT NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION	THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Hydraulic Characteristics in the Tunnel

Fig. 6.1

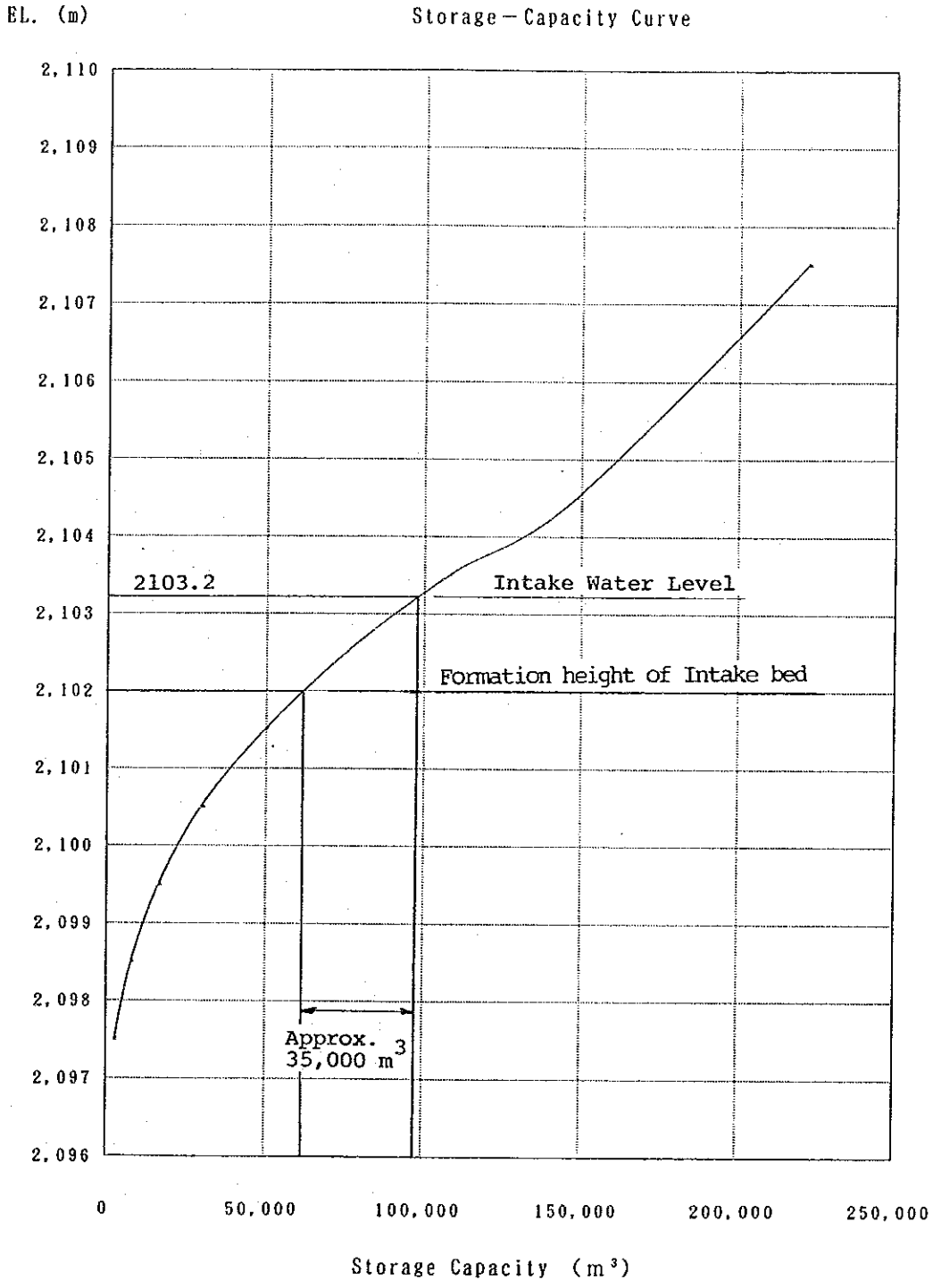


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Fig. 6.2

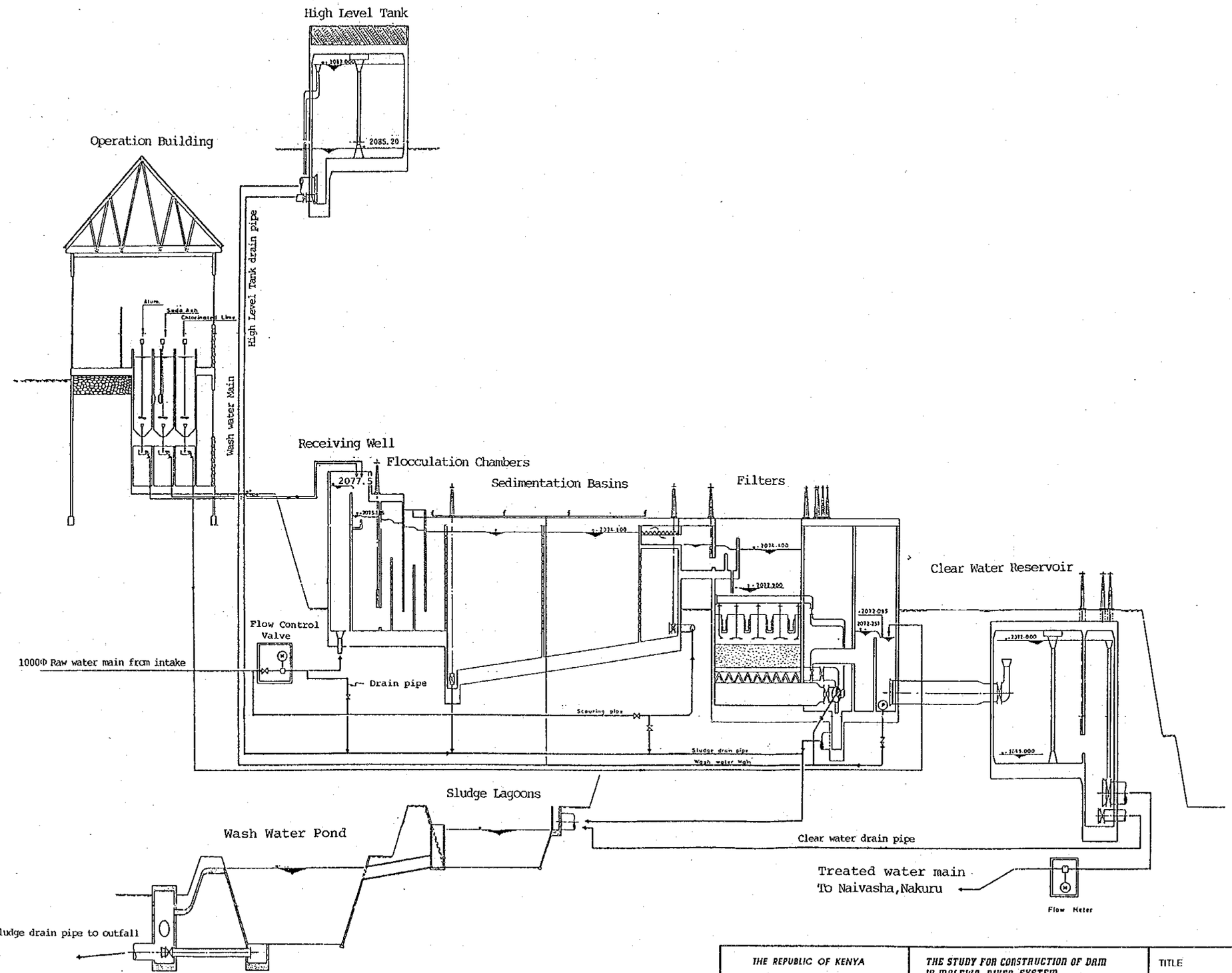

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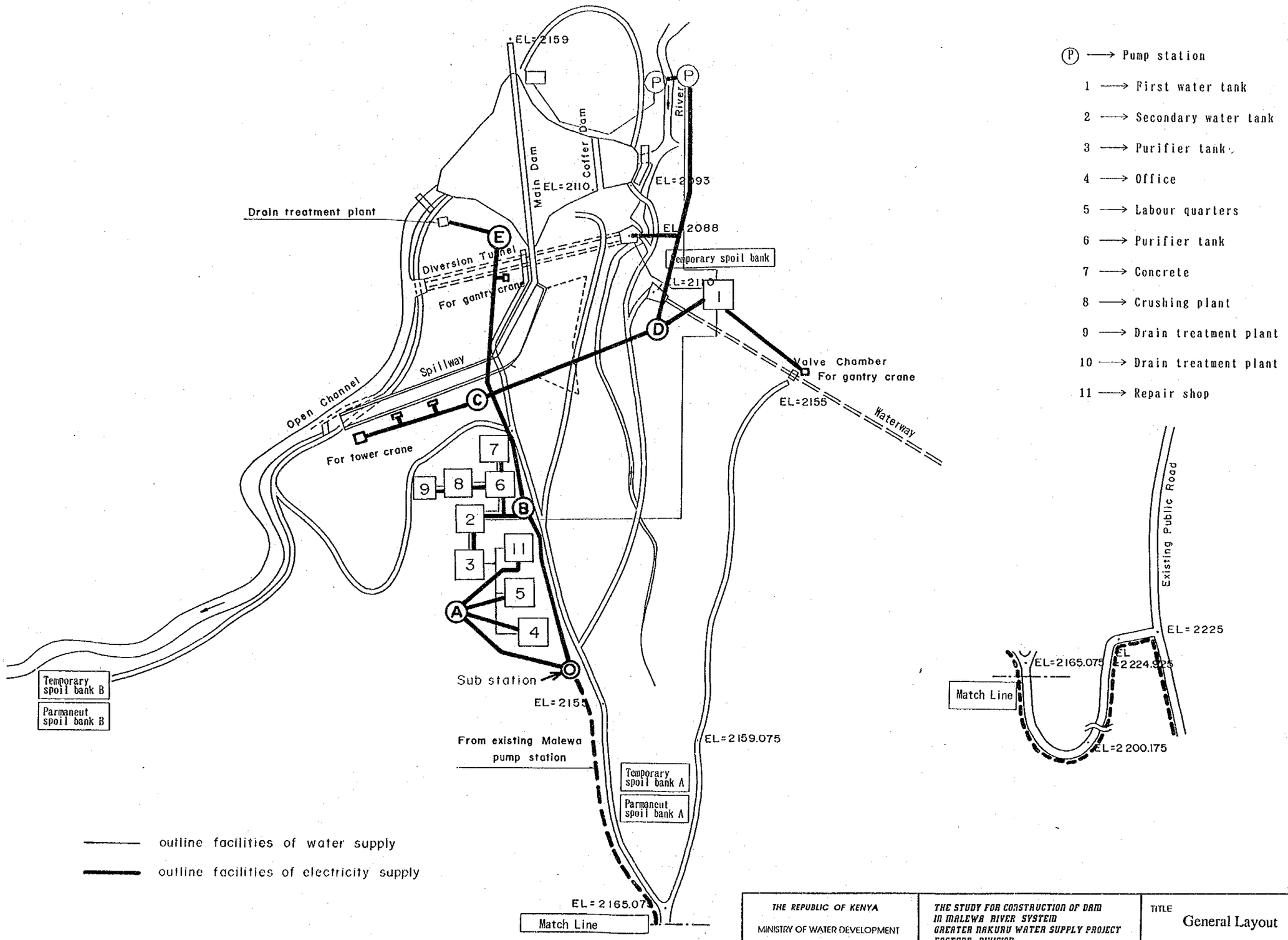
Fig. 7.1



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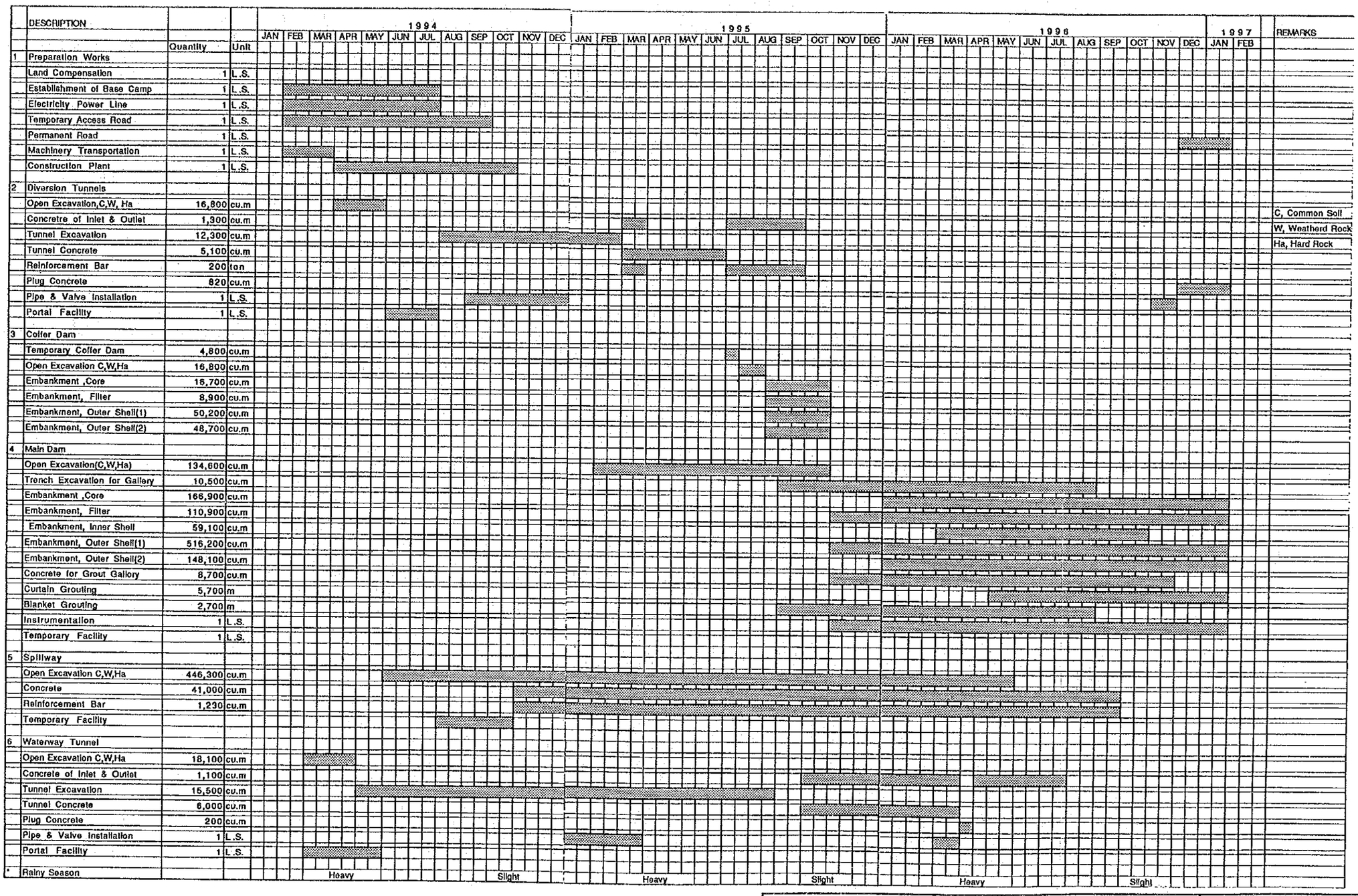
	DESCRIPTION	Quantity	Unit
1	Preparation Works		
	Land Compensation	1	L.S.
	Establishment of Base Camp	1	L.S.
	Electricity Power Line	1	L.S.
	Temporary Access Road	1	L.S.
	Permanent Road	1	L.S.
	Machinery Transportation	1	L.S.
	Construction Plant	1	L.S.
2	Diversion Tunnels		
	Open Excavation,C,W, Ha	16,800	cu.m
	Concretre of Inlet & Outlet	1,300	cu.m
	Tunnel Excavation	12,300	cu.m
	Tunnel Concrete	5,100	cu.m
	Reinforcement Bar	200	ton
	Plug Concrete	820	cu.m
	Pipe & Valve Installation	1	L.S.
	Portal Facility	1	L.S.
3	Coffer Dam		
	Temporary Coffer Dam	4,800	cu.m
	Open Excavation C,W,Ha	16,800	cu.m
	Embankment ,Core	16,700	cu.m
	Embankment, Filter	8,900	cu.m
	Embankment, Outer Shell(1)	50,200	cu.m
	Embankment, Outer Shell(2)	48,700	cu.m
4	Main Dam		
	Open Excavation(C,W,Ha)	134,600	cu.m
	Trench Excavation for Gallery	10,500	cu.m
	Embankment ,Core	166,900	cu.m
	Embankment, Filter	110,900	cu.m
	Embankment, Inner Shell	59,100	cu.m
	Embankment, Outer Shell(1)	516,200	cu.m
	Embankment, Outer Shell(2)	148,100	cu.m
	Concrete for Grout Gallery	8,700	cu.m
	Curtain Grouting	5,700	m
	Blanket Grouting	2,700	m
	Instrumentation	1	L.S.
	Temporary Facility	1	L.S.
5	Spillway		
	Open Excavation C,W,Ha	446,300	cu.m
	Concrete	41,000	cu.m
	Reinforcement Bar	1,230	cu.m
	Temporary Facility		
6	Waterway Tunnel		
	Open Excavation C,W,Ha	18,100	cu.m
	Concrete of Inlet & Outlet	1,100	cu.m
	Tunnel Excavation	15,500	cu.m
	Tunnel Concrete	6,000	cu.m
	Plug Concrete	200	cu.m
	Pipe & Valve Installation	1	L.S.
	Portal Facility	1	L.S.
*	Rainy Season		



THE REPUBLIC OF KENYA
MINISTRY OF WATER DEVELOPMENT
NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION

THE STUDY FOR CONSTRUCTION OF DAM IN MALEWA RIVER SYSTEM GREATER NAKURU WATER SUPPLY PROJECT EASTERN DIVISION
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
Construction Schedule of Malewa Dam

Fig. 7.3

DESCRIPTION	Quantity	Unit
Stage 2-1		
Preparation Works		
Intake Facility	1	L.S.
Tunnel	190	m
Sand Basin	1	L.S.
Raw Water Mains	9.4	km
Treatment Works	1	L.S.
Treated Water Mains to Nakuru	51.0	km
Treated Water Mains to Naivasha	28.7	km
Distribution Facilities to Nakuru & Gilgil	1	L.S.
Distribution Facilities to Naivasha	1	L.S.

DESCRIPTION	Quantity	Unit
Stage 2-2		
Preparation Works		
Raw Water Mains	9.4	km
Treatment Works	1	L.S.
Treated Water Mains to Nakuru	51.0	km
Treated Water Mains to Naivasha	28.7	km
Distribution Facilities to Nakuru & Gilgil	1	L.S.
Distribution Facilities to Naivasha	1	L.S.

DESCRIPTION	Quantity	Unit
Stage 2-3		
Preparation Works		
Treatment Works	1	L.S.
Distribution Facilities to Nakuru & Gilgil	1	L.S.
Distribution Facilities to Naivasha	1	L.S.
Rainy Season		

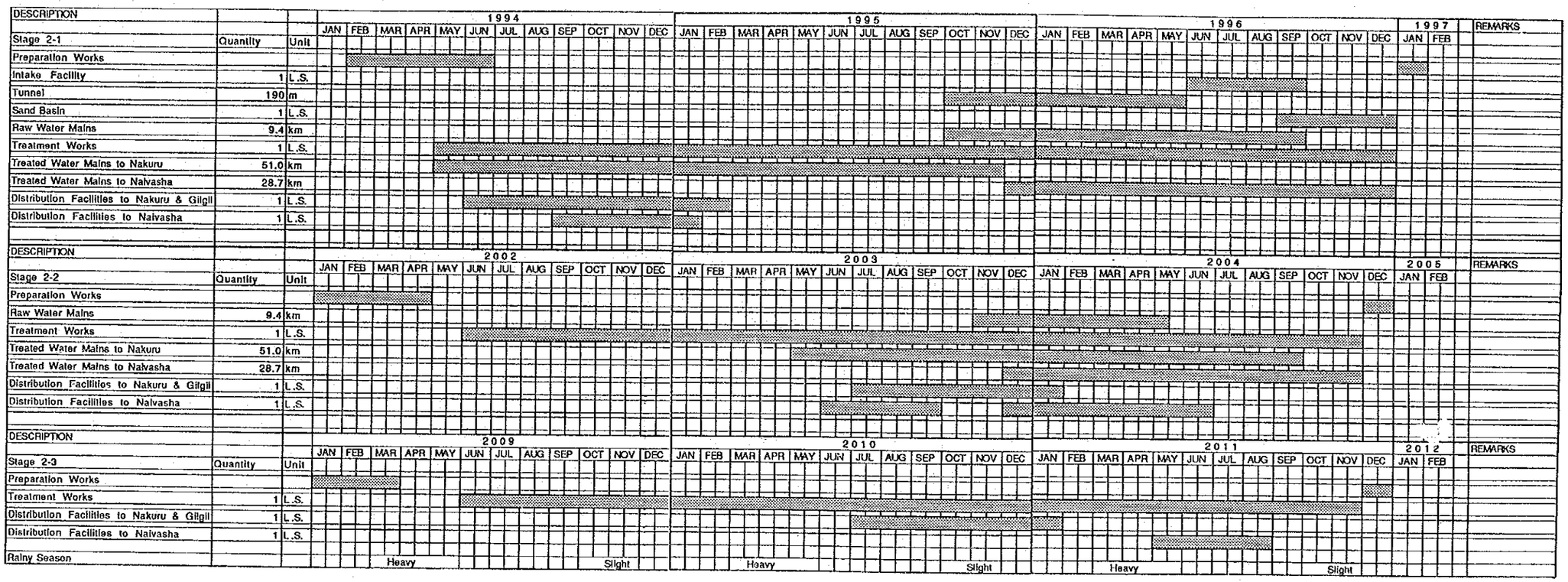


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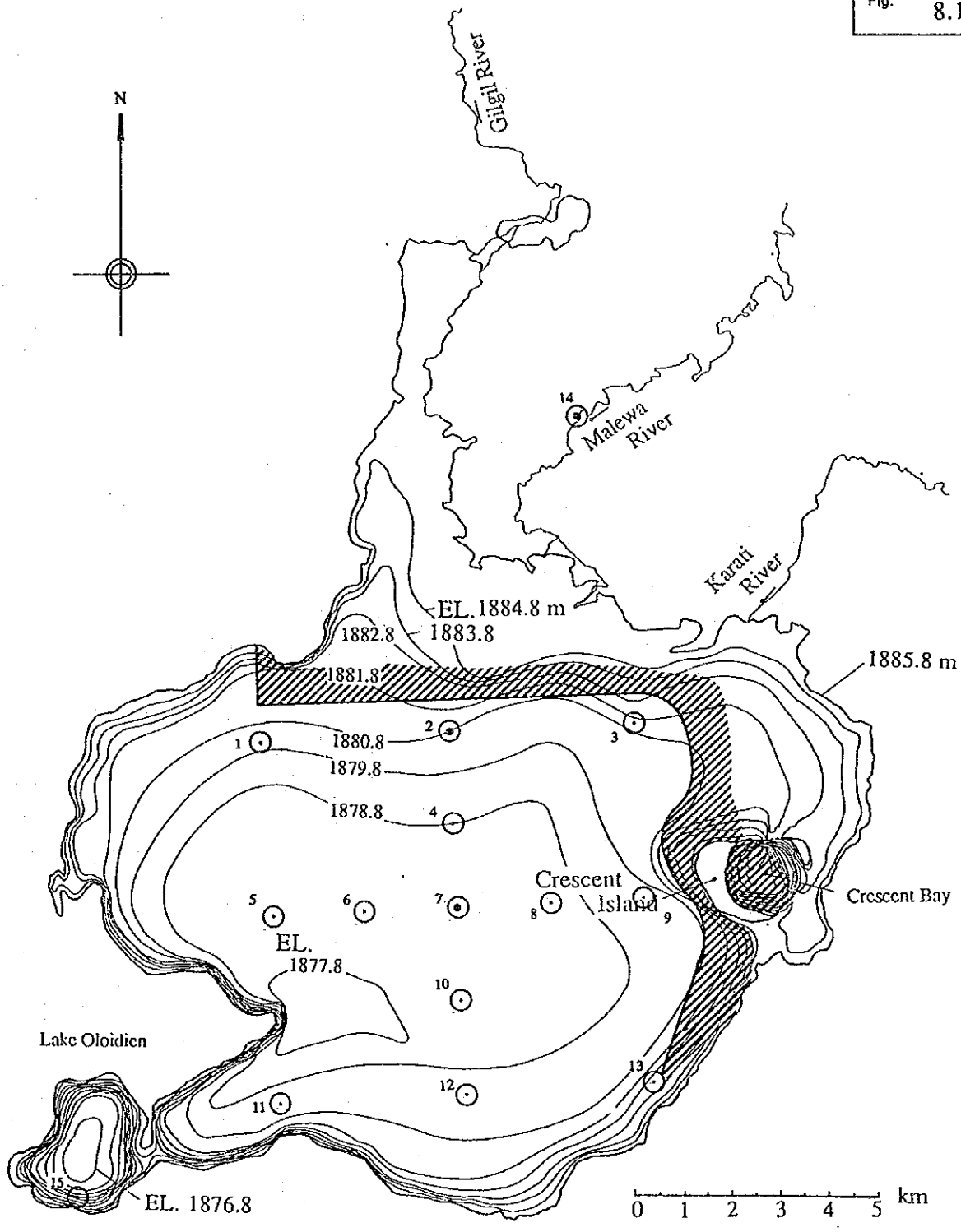
Fig. 8.1



Legend

- ○ Water quality survey sampling points
- • Water quality monitor and plankton sampling points
- ▨ Aquatic plant survey

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